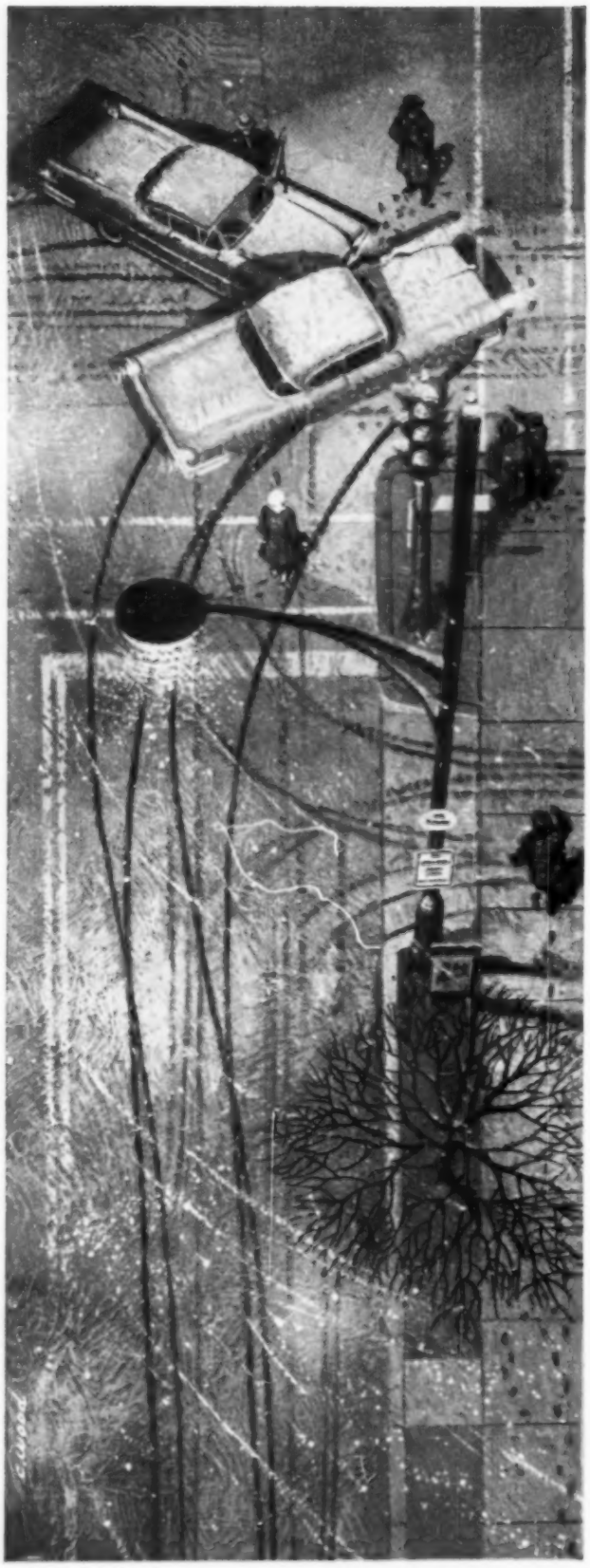
Traffic Safety

A NATIONAL SAFETY COUNCIL PUBLICATION

DECEMBER 1958

I CAN'T imagine any more important work—any more challenging work—and I would truly like to be sufficiently eloquent to express the feelings of the American people to those of you who give their time and their effort and their substance to help our great country to be stronger and safer—who belong, in short, to the National Safety Council.

President Eisenhower at the National Safety Congress Banquet



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Circle Item No. 2—Reader Service Card

Traffic Safety Book Reviews

Youth at the Wheel, by Harold T. Glenn. Published by Chas. A. Bennett Co., Inc., Peoria, Ill., 1958, 415 pages, $3.60.

Youth at the Wheel will be refreshing indeed to the nation's new and young drivers. It features an unusual number of pictures and illustrations, and the text is purposely slanted to catch the interest of the young driver.

Teachers may have a difficult time using it as a teaching tool because in some sections of the book subject matter has been sacrificed for pictures. This is especially true in the outlining of various techniques needed to drive skillfully on our streets and highways.

The book is more suitable for courses in advanced driver education than those courses which deal with people driving for the first time. This is true for two reasons: one, a great deal of copy and illustrative material is devoted to attitudes; and two, skill and knowledge have been expertly interwoven with examples of good driving attitudes.

The book is outstanding in many ways. It has simplicity of style, a wealth of up-to-date information, accuracy of detail and handy size. Educators should consider this book for use as a supplement or reference book in driver education courses.

by Ivan L. Eland
Traffic Consultant
School and College Division

Better Driving, by Edward W. Pepyne, William A. Mann, and Horace C. Hartsell, Highway Traffic Safety Center, Michigan State University. Published by Prentice-Hall, Inc., Englewood Cliffs, N. J. 130 pages.

Better Driving is aimed at any of us who drive an automobile, no matter how much we think we know or how good we think we are. Nobody could fail to profit by taking the small amount of time necessary to absorb its 130 pages.

After defining the traffic accident problem as "war," the authors go on to make the usual comparison of U. S. war casualties with U. S. traffic casualties and include a rather startling statement that "About one out of every

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Traffic Safety

Volume 53 Number 6 DECEMBER 1958

A NATIONAL SAFETY COUNCIL PUBLICATION

TRAFFIC SAFETY is dedicated to the prevention of traffic accidents through the presentation of objective information and responsible opinion to official agencies, public support groups and the motor transportation industry. The views expressed do not necessarily reflect the beliefs or policies of the National Safety Council, but they are presented in the conviction that the pressing social problem of traffic accidents can best be resolved through freedom of expression and open debate.

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BETWEEN STOPS

THE MAN and the words that made the 46th Annual Safety Congress memorable appear on this month's cover.

President Eisenhower paid a surprise visit to the Congress during the annual banquet. The president's appearance had been kept a secret — but the inevitable rumors started. By the time Ike arrived, the air was electric with expectancy.

A standing ovation greeted the smiling President, and wild cheers paced his march through the Grand Ballroom of the Conrad Hilton hotel to the speaker's table.

His message was brief, but it left every listener with a renewed sense of dedication to the cause of safety.

Pictured on the cover with Ike are Walter F. Carey, chairman of NSC's board of directors, and retiring NSC President Ned H. Dearborn.

SEPTEMBER TRAFFIC TOLL SHOWS SLIGHT DECLINE

Record for year down 6 per cent from 1957

THE nation's traffic toll came down again in September — but just barely.

There was a 1 per cent drop in September traffic deaths from the same month last year. It was the smallest monthly decrease since October of 1957.

Despite the September slowdown in improvement, the traffic death toll for the nation at the end of nine months still was 6 per cent below the same date last year—26,180 in 1958 against 27,770 in 1957.

It is estimated that traffic accidents in the first nine months of 1958 also brought disabling injuries to about 900,000 persons.

The highway death total for September alone was 3,300, as compared with 3,330 for September last year.

September was the 13th month in a row and the 21st in the last 22 to show a drop in traffic deaths from the same months of the year before. The only lapse in the long period of steady improvement came in August of 1957. The downward trend began in December of 1956.

The sustained dip in the traffic toll is encouraging. But no one can cheer too wildly over the 1 per cent drop in September — especially when we are entering the most dangerous traffic period of the year.

Vehicular travel across the nation went up 2 per cent in the first seven months of this year (latest figure available). Traffic deaths went down 7 per cent in the same period. This produced a mileage death rate (number of traffic deaths per 100 million vehicle miles) of 5.1—lowest on record for the first seven months of any year and 9 per cent below the rate of 5.6 for the same period last year.

The mileage death rate for July alone also was 5.1—lowest for any July in history.

Of the 48 states, 23 had fewer deaths in September than a year ago, while 25 had increases.

For the first nine months, 32 states showed decreases, 15 had increases and one reported no change.

Cities had a 7 per cent decrease in traffic deaths in September, according to reports from 664 cities of more than 10,000 population. For nine months, these cities showed a 5 per cent decrease from last year.

Of the 664 cities, 554 had fewer deaths or no change in deaths in September. For nine months 439 had fewer deaths or no change.

In September 497 of the 664 reporting cities had perfect records. The three largest were Milwaukee (711,000), Indianapolis (461,700), and St. Paul (313,400).

For nine months 172 cities still had perfect records. The three largest were Orlando, Fla. (89,300), Evanston, Ill. (76,200), and Bethlehem, Pa. (74,000).

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Leading at the End of September

States

South Carolina	—25%	Rhode Island	—10%	Toledo, Ohio	—43%	Los Angeles, Calif.	—13%
West Virginia	—25%	Wisconsin	— 9%	Long Beach, Calif.	—40%	Portland, Ore.	—13%
Iowa	—21%	Texas	— 8%	St. Louis, Mo.	—25%	Worcester, Mass.	—11%
Connecticut	—18%	Missouri	— 7%	San Francisco, Calif.	—25%	Wichita, Kan.	— 8%
Vermont	—18%	Utah	— 7%	Cincinnati, Ohio	—25%	Flint, Mich.	— 8%
Alabama	—17%	New Hampshire	— 7%	Cleveland, Ohio	—22%	Milwaukee, Wis.	— 7%
Illinois	—15%	Virginia	— 6%	Indianapolis, Ind.	—22%	New Orleans, La.	— 7%
Pennsylvania	—13%	California	— 5%	Akron, Ohio	—21%	Boston, Mass.	— 6%
Ohio	—13%	North Carolina	— 5%	Washington, D. C.	—20%	Oakland, Calif.	— 6%
Arkansas	—13%	Montana	— 5%	Dayton, Ohio	—20%	Omaha, Neb.	— 6%
Michigan	—12%	Oklahoma	— 3%	Detroit, Mich.	—16%	Chicago, Ill.	— 4%
New Jersey	—12%	New York	— 2%	Providence, R. I.	—15%	Birmingham, Ala.	— 4%
Indiana	—12%	Kansas	— 2%	Atlanta, Ga.	—14%		
Wyoming	—12%	Oregon	— 2%				
New Mexico	—11%	Georgia	— 1%				
Maryland	—10%	Kentucky	— 1%				

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*At the Board of Directors Meeting held October 21, 1958, approval was given to a recommendation from the Traffic and Transportation Conference that the name of the conference be changed to "Traffic Conference," and that a new "Motor Transport Conference" be formed. The appropriate fields of interest of the two conferences were also established. As this action by the board is implemented, details will be reported in TRAFFIC SAFETY.

IKE AT CONGRESS

IKE was there!

That was the big news at the 1958 National Safety Congress.

Taking time out from a crowded schedule the President, accompanied by Gov. William G. Stratton and Sen. Everett Dirksen of Illinois, dropped in at the annual banquet held Wednesday evening of Congress week at the Conrad Hilton Hotel.

Another important event of the evening was the presentation of tributes to retiring President Ned H. Dearborn of NSC by the National Association of Manufacturers, the Chamber of Commerce of the United States, the American Federation of Labor—Congress of Industrial Organizations and the American National Red Cross. Mr. Dearborn plans to retire within the next few months.

The banquet was the highlight in a week of intensive study of the traffic accident problem by traffic and transportation people.

Traffic sessions this year were characterized by fewer speakers and more audience participation than usual. This resulted in a clearing house type of operation in which ideas were freely exchanged.

Much attention was given to electronic developments in engineering

Crowds: Safety marches on at big registration

Sparkle: Northerners sing for delegates' supper

Northwestern Reviewing Stand airs safety men

Dearborn presents Dow award to Frank J. Wirken

and enforcement, to growing population trends and their implications for traffic safety, and to the use of driver licensing control as a prime tool in curbing the careless driver.

Motor transportation people were treated to a versatile program which included workshops, debates, panel interviews and chart talks.

In the commercial vehicle sessions the architecture of the safety program was the theme. A plan of sound programming—built on a combination of time-tested techniques plus new ideas—was developed.

Transit sessions were mainly concerned with measuring driver safety performance. The value of aptitude testing, the development of the driver supervisor, and the question of special recognition for good safety performance were considered. Safety in the public relations picture also was discussed.

The National Fleet Safety Contest Award Luncheon, sponsored by General Motors Corp., wound up the Motor Transportation program.

STARS IN MUFTI

Two wartime generals—President Eisenhower and NSC's Executive Vice President George C. Stewart—had time for a short visit as they strolled to the Congress banquet. Gen. Stewart, who had served on Ike's staff during World War II, met the President at the entrance of the Conrad Hilton hotel and escorted him to the grand ballroom.

Strategy: Managers in huddle with Gen. Stewart

Thrills: Protect-o-matic stages big night show

Madison Avenue and U. S. 1

Does it pay to advertise safety?

By Theodore S. Repplier

MADISON AVENUE seems to be the public symbol of the advertising business. I want to tell you how Madison Avenue has joined the organized safety movement in trying to reduce sudden death on U.S. 1.—U.S. 1 being, of course, the symbol of all the highways in America.

If I may throw our time machine into reverse for a moment, we will back up as far as World War II. Shortly after Pearl Harbor, a number of the leading figures in advertising went to Washington and said, in effect: "Gentlemen, during the shooting, there isn't going to be much advertising of cars and gasoline and many other things. Hence, we hereby volunteer our services, without charge or strings attached, to do any informing or persuading that Uncle Sam needs on the home front."

And the government said, "Okay, try your hand at stopping wartime inflation through voluntary means. See if you can blot up all the money that can't be spent for consumer goods by selling U. S. government bonds. And hurry up, or we may have to make saving compulsory."

This seemed like quite a tall order, so everybody went back to the various Madison Avenues of the country, thought it over, and formed The War Advertising Council, a non-profit corporation. Its purpose, then as now, was to use and to mobilize the forces of advertising for the public welfare. It included on its board of directors all the forces in what we in this business call mass communications. Composing The War Advertising Council were advertising agencies, the national companies who are the advertisers, newspapers, magazines, the broadcasting networks and stations, outdoor advertising, transit advertising—in fact, the only communicators not on the council's board of directors are Navaho Indian smoke signalers.

Very early in the war, The Advertising Council helped the Treasury Department launch the payroll savings plan for war bonds. Soon the wartime advertising jobs were too numerous to mention. People had to be persuaded to save waste paper, fats and tin, to raise vegetables in their back yards, to button their lips, to join the WACs, to work in war plants, to give to the Red Cross and the USO, to observe rationing and many, many others.

At the end of the war, about a billion dollars worth of advertising, at commercial rates, had been given away to wartime projects. And the people of the United States had *voluntarily* saved the money, bought the bonds, remedied the shortages of food, material and manpower—had, in short, done just about everything asked of them, once they understood what was needed, and why.

Theodore S. Repplier

Now this was an eye-opening experience to a lot of people. It proved that there is a way to get difficult things done by masses of people with reasonable speed in a rather large democracy, and to get them done within the framework of our voluntary society.

The result was that at the end of the war, everybody, including the President of the United States, said The War Advertising Council was too valuable to discontinue. So the word "War" was deleted from its name, and the money to run it was quickly raised from advertising and business.

It was just about this time that Madison Avenue first became conscious of U.S. 1. During the war years, except for the chiseling minority who managed to get gasoline without benefit of ration coupons, motorists gave their cars very little exercise. When the war was over, and the dried up rivers of gasoline started to flow again, drivers leapt into their cars with a whoop and a holler, took to the highways, and started belting each other over the scenery.

The National Safety Council disapproved of this, and President Ned H. Dearborn wondered whether advertising might not apply its talents to the problem, as it had to so many wartime tasks. The Advertising Council, which had great respect for the effective publicity operation conducted

This address was presented by Mr. Repplier, president of the Advertising Council, at the banquet of the 46th Annual Safety Congress.

at the Safety Council by Paul Jones, said it would be very glad to help.

That was back in 1945. We have been doing a national campaign on highway safety ever since. This makes safety our oldest living non-government client.

During this time the "Stop Accidents" campaign, as we call our safety campaign, has had the free services of four volunteer coordinators. Frank Ennis, American Fore Loyalty Group of Insurance Cos., served in 1945. Carleton Healy, Hiram Walker, Inc., served in the early part of 1946. Wesley I. Nunn, Standard Oil Co. (Indiana), served from 1946-1953 and is famous for, among other things, the phrase "Be Careful—The Life You Save May Be Your Own." H. T. Rowe, director of information, International Business Machines Corp., has served from 1954 to the present.

Five advertising agencies have prepared the advertising for the traffic safety campaign without charge. First, Newell-Emmett Co., next Foote, Cone & Belding, Inc., then Young & Rubicam, then Cecil & Presbrey, and for the past several years Campbell-Ewald.

The Advertising Council keeps reasonably accurate records of the advertising time and space which are secured for each of its campaigns. Here is what has been contributed through advertising during the period of The Advertising Council's campaign:

- More than 62,000 full pages of newspaper space.
- A quarter of a million outdoor posters.
- Nearly a million car cards, displayed in buses and street cars.
- 426 pages of consumer magazine advertising.
- 14 billion radio and television home impressions. (A home impression is one message heard once in one home. This is more than 3,000 times the circulation secured by a full season's run of the Ed Sullivan television show.)

This much advertising would have cost something like 130 million dollars.

Now at this point, let me raise an ugly question. Did all this advertising do any good?

The only honest answer to that question is that nobody can *prove* that it did.

Could anyone deny this baby a few minutes?
Certainly not the mother or father. And surely you, a stranger, would not begrudge a few minutes of your time to protect this baby's life—or yours!
Driving faster than road conditions or the law allows can shorten your trip no more than two or three minutes. Is this saving worth the risk of a precious life? For minutes like these can mean the difference between life and death.
Last year, nearly 40,000 men, women and children died in traffic accidents. In 3 out of 10 fatal crashes, speeding was a factor. Think how many lives just minutes can save . . . and slow down!
Help stop senseless killing on our highways. Drive safely yourself.
Insist on strict law enforcement for your own protection.
Work actively with others to support your local Safety Council.
Remember—where traffic laws are strictly enforced, deaths go down.
BACK THE ATTACK ON TRAFFIC ACCIDENTS
Published in an effort to save lives, in cooperation with The National Safety Council and The Advertising Council

MORE than 10,000 mats such as this were used during 1958 by newspapers cooperating with the Stop Accidents Campaign.

At least one critic seems to think it did no good whatsoever. John D. Williams, head of the mathematics division of the Rand Corp., writing in *Fortune*, takes a dim view of the effect on traffic accidents of what he calls "psychological attacks, legal and police action." I could be more influenced by Mr. Williams if he did not take the position that we probably don't kill *enough* people in traffic accidents as it is. He says more people are being born than are dying and seems to feel that dying is a Good Thing.

Now no one would argue that better roads, better cars, better law enforcement, better safety practices have not all been important factors in bringing down the death rate. But to so minimize what goes on in the *mind* of the driver, which advertising and publicity is designed to influence, seems to me to be carrying the mechanistic approach much too far.

Perhaps we could arrive at a more objective judgment of the effectiveness of public service advertising if, for a moment, we got away from the safety field altogether. It might be helpful if we took a look at what has happened when these same advertising techniques were applied to another national problem. Let's take the case of forest fires.

In 1942, The Advertising Council

began a campaign to reduce the number of forest fires. Our client was, and is, the United States Forest Service.

Since the vast majority of forest fires are caused by human failings, the job here was to induce people to be careful.

Forest fires could be reduced only if those in wooded areas were persuaded to be more careful with campfires, cigarettes and matches. And this meant reaching virtually everybody who owned an automobile and was strong enough to flip a lighted cigarette out of a car window.

Just as in traffic safety, which must take into account the increasing number of cars traveling an increasing number of miles, so in forest fire calibration we must take into account the number of people in the woods. The more people, the more fires, people having less sense in the woods than the animals.

The forest fire prevention campaign started in 1942 and has been going ever since.

Smokey the Bear lumbered into the campaign a few years later, and soon became so popular that Congress, amid cheers and laughter, passed a law making him federal property. Under this law, the Forest Service now licenses manufacturers to use Smokey's picture on everything from T-shirts to ash trays, and the resulting revenue is used to pay for more forest fire campaign materials.

Fires Down—Traffic Up

Did this forest fire advertising do any good? Now please note, there is no automatic factor here which would reduce the number of fires. 1957-model weather was no better than 1942 weather. Yet, according to U. S. Forest Service figures, this is what happened:

A five-year average of the forest fires occurring *before* 1942, when the campaign began, was 210,000 fires per year.

By 1956, this had been reduced to 143,000. And in 1957, to 83,000 fires.

This would be a good record if the traffic in the woods had stayed the same. But while the number of fires was going down, traffic through the forests was sky-rocketing. In 1942, there were 10 million forest visitors; in 1957, 60 million—six times as many. So fires, instead of being more than cut in half, should have increased six fold.

According to the Forest Service, if you take the pre-campaign rate of forest fires and project it, you discover that 600,000 forest fires were prevented.

From this you may gather that I believe in the power of advertising. I do. Every year The Advertising Council conducts about 15 campaigns. And every year I see surprising things happening.

Advertising has the power to change habits. During the period of our Religion in American Life campaign, church attendance has increased about 12 per cent.

It has power to gain quick acceptance for new ideas — as seen, for example, by the increase in donations to colleges since the start of our campaign on their behalf.

Yet because advertising deals with people, and because people are as individual as their finger prints, our knowledge is like the iceberg—most of it is yet to be revealed.

Perhaps there is somewhere a thought so compelling that it would work wonders with traffic accident statistics. I would be the last to say it could not happen.

Recently, I wrote to three distinguished psychiatrists, all personal friends of mine, and asked them some questions about accidents and advertising.

Anger Causes Carelessness

Dr. William B. Terhune, who directs the famous sanitarium at Silver Hill in Connecticut, feels that safety advertising which tries to install fear, shame, or fear of punishment will get only limited and probably short-lived results.

This, he says is because most of us sincerely believe we are good people and that the other fellow is the culprit. The problem is, he says, to get drivers to quit projecting the blame to others.

He thinks much careless driving is due to anger—anger with one's place in life, anger because of one's personal failures, such as being late. And, he

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U.S.S.R. Vetoes UNsafe Driving

THE RUSSIANS have intricate traffic rules, even though traffic is extraordinarily slight by our standards, and to get a driver's license is not easy. This means among other things, that the foreign embassies are dependent in the main on Soviet chauffeurs. Very few Americans in Moscow have ever passed the Soviet driving test. Among other things you have to be approved by a *panel* of physicians, not merely one, including an eye doctor, a cardiologist, a back specialist, and one who tests reflexes in the soles of your feet. You have to work out traffic problems with model cars on something that looks like a parchesi board, and prove that you can take apart and mount an engine.

Traffic accidents (for anybody) are a very serious matter, and offenders are punished with severity. Even if you scrape somebody's fender you lose your license for a year, and if you accumulate three violations you lose it *for life*. In the interests of safety, no more than two persons are permitted on the front seat.

Late in 1956, two hospital workers in Podolsk got drunk, ran off with an ambulance and went on a joyride with their wives. The ambulance hit a bus, and later knocked down and injured two pedestrians. The ambulance driver abandoned his vehicle and ran away. He was caught, and was sentenced to *25 years* in jail.

—From John Gunther's *Inside Russia Today*.

Birdcage lights on way out

The last of San Francisco's famed birdcage traffic signals—which give a triple warning of lights, clang and alternating STOP and GO signs—will disappear from the streets by the end of the year. When first introduced in the early '20's, the birdcages marked San Francisco as the city with the world's most modern traffic control system.

Plastic pavement retards skidding

A new plastic-coated safety pavement, said to retard skidding and allow cars to stop in a half to three-quarters of the normal distance is now being tried out on several well-traveled highways. When poured on a conventional asphalt surface and covered with grit as it begins to harden, the coating gives a thin, sand-like surface.

Coffee road block

Some drivers in New Mexico may owe their lives to a coffee road block set up during the Labor Day weekend. Townspeople of the village of Moriarty turned strangers into friends by halting all pre-dawn traffic with the help of state police and offering coffee and cookies.

Store publicizes improvement school

One of Chicago's leading department stores gave an assist to the city's driver improvement school by running a month-long project to publicize the school. The store set up a booth, flanked by displays, in a prominent location. A police officer was in attendance at all times and shoppers were invited to sign up for the driver improvement course.

Dade County challenge

In August the Dade County Citizens Safety Council challenged Oklahoma City to a safe driving contest. The community finishing the year with the lower traffic fatality rate (based on number of vehicles registered in city) will be the winner. Each reports weekly on its traffic accident experience. Local TV stations are exchanging film on traffic conditions and all media are cooperating fully.

Holiday driving package

Spector-Mid States Freight System, Inc. has come up with a holiday driving package designed to make the public safe driving conscious. Before a holiday, the company sends a package to each of its 28 terminal managers. Each package contains a safe driving press release—featuring a local Spector driver—for publication in local papers. It also contains detailed instructions for a community safe-driving project. Entire promotion is geared to company slogan: "Life's wonderful . . . enjoy it . . . drive safely!"

Let's Stop Tire Killings

by Singleton Shaeffer

THERE'S a killer loose on our highways — especially on the turnpikes. This killer was once someone's friend and protector, a lifesaver in an emergency. Now, growing bald and losing its grip, the killer tire has become a public enemy in far more auto accidents than the public realizes.

Police are trained investigators, but too often this killer slips through the net of blame, masquerading under the names of "Too fast for conditions" or "Lost control on curve" or "Hazardous highway conditions." We need to strip off these disguises and identify this killer once and for all.

Bluntly speaking, my stomach turns over when I see a worn tire. It brings sickening mental pictures of the many dead and injured I have seen, spewed over our highways in their grotesque and ludicrous resting places, pinned in torn and jagged metal, horribly festooned with baggage, canned goods and children's toys. I feel the frustrating urgency of waiting for an ambulance which will whisk the broken bodies out of sight toward the merciful hands of hospital attendants. It all seems so senseless in this peaceful country of ours that I feel a compelling urge—even a moral obligation to speak out with what I know about the dangers of worn tires.

Believe me, I do know something about it. I'm no safety expert, but for 32 years I have been investigating auto crashes at the highway level—in the dirt, the grease, the blood, and even the tears. You be the expert, but let me tell you what I've learned—by accident!

First, let me point out that God, in his infinite wisdom, saw fit to place tread on the tips of your fingers. The loops and whorls of your fingerprints were not put there for identification alone. If they were eliminated, you would have difficulty holding a wet glass of water, a cake of soap, or a lifesaving grasp on any object you might reach for. This is a friction grip. On the highways it's called coefficient of friction. It's the difference between life and death on the highway.

My fellow troopers and I conducted the only realistic research I know of on the relationship of bald tires to accident frequency. The reports studied were our own accident investigations, checked and rechecked by competent traffic officers. Our laboratory was the Pennsylvania Turnpike. The results confirmed our belief that we not only had a state problem, but one of national significance as well.

Bald as Yul Brynner

Even in Pennsylvania, with its outstanding program of compulsory semi-annual vehicle inspection, faulty tires get by because we don't have a statute requiring tread on tires—only that the breaker strip, fabric or cushion gum is not showing. Amazingly, the spare tire is not included in the inspection at all. In other words, tires can be as bald as Yul Brynner, as long as they don't have a hole showing.

Since our concern with tires began several years ago, we have continued to gather data and experiment with remedial action. With a limited police force to patrol the 360-mile mainline of the Turnpike, which carries almost an equal amount of out-of-state and Pennsylvania traffic, it is not possible to man each interchange or to stop traffic to check the condition

Capt. Shaeffer is commanding officer, Troop "C," District Two, Pennsylvania State Police.

of tires. However, spot checks were made at interchanges, at service areas, or when the police stopped a motorist for any reason. Thousands of written warnings were issued and hundreds were put off the Turnpike with tires unfit for travel.

In 1956 faulty tires accounted for 29 per cent of the fatalities on the Turnpike. The relationship of good tread and weather was emphasized by the record during July and August of that year, when 68 per cent of the fatalities involved bad rubber. Our deduction was simply that the two-month period was unusually wet, coupled with the failure of vacationists to check their tires as thoroughly as they check their fishing tackle. Confirmation of this suspicion came when we visited one of the largest authorized service garages for the Turnpike and found that 98 per cent of the wrecked vehicles had bald tires. Some of the latest models with original tires were treadless.

In 1957 the percentage of fatalities involving tires was reduced to 19. The record would have been better if a wet autumn had not brought a rash of skidding accidents. As many as five persons were killed in one accident caused by bare tires.

What can be done? Our warning efforts have limitations. It's not primarily a police problem anyway. Controls must first come through proper laws in all states to prohibit the use of faulty tires. We have brake laws. Why not an adequate tire law? It is not enough to make sure your own car is safe. You are still risking a shattering, bone-crushing head-on collision if the other fellow skids into your path.

"We Didn't Know"

The blowout, although bad enough to take several lives a year on the Turnpike, is not the worst tire hazard to fear. It is the treadless, skidding, out of control vehicle that seeks its victims among the innocent travelers going in the opposite direction.

We interviewed thousands of motorists whose tires were considered unsafe. Not bent on killing themselves or anyone else, they had a common answer, "We didn't know they were that bad," or "Why didn't the garageman who inspected the car tell us?"

The No. 1 problem of the superhighways is still fatigue and lack of sleep. The many more thousands of miles of superhighway in the making probably won't change this situation. However, the constant No. 2 killer—too fast for conditions, with its hidden tire problem—can and should be brought under control now.

It is the prayer of those of us who patrol the highways that some immediate action be started among our legislators, safety groups and administrators which will end the reign of death of bad tires, at least one known cause of our nation's traffic toll.

WHAT YOU CAN DO TO HELP. Contact the state legislator of your district. Find out what protection you have against the use of a faulty tire under your state laws and, if inadequate, you might suggest as a minimum the following: (1) That all vehicles operated on a public highway have at least a sixteenth of an inch of traction tread around the entire periphery of the tires, including the spare. (2) Make it illegal to offer for sale a used tire not having a sixteenth of an inch tread as described or otherwise damaged in the side walls or casting making it unsafe for use. (3) Make illegal the resale of tire casings for recapping purposes that are not considered sound in the side walls and cords. (4) require a semi-annual inspection of tire equipment, along with other safety

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THIS blowout threw car out of control and over an embankment.

TROOPER puts finger on culprit in accident that cost three lives. Car spun out of control, crossed highway striking oncoming car.

OHIO KEEPS IN TOUCH BY TWO-WAY RADIO

Highway officials credit new system with speedy snow removal and constant flow of road condition information

RAPID communications are vital to efficient control of highway construction and maintenance and to the safe and smooth movement of traffic both on a state and district level. They become even more vital in time of emergency conditions emanating from adverse weather conditions and highway-jamming major traffic accidents.

In building an extensive two-way radio system throughout its operations over a six-year period, Ohio's department of highways has established one of the nation's outstanding communications systems.

Ohio's unique highway department radio communications system was begun in 1951 with the installation of 18 mobile radio units in Ashtabula County, located in Ohio's northeast corner, where most snowfalls are measured in feet rather than in inches. During the next two winters, the system proved its value. The time required for snow and ice removal on state highways was slashed tremendously in Ashtabula's "snow belt." Radio units were distributed among 16 plow-equipped trucks, a mechanic's truck and a superintendent's car.

Telephones Often Failed

The two-way radio units aided immeasurably in prompt road clearance after heavy snowfalls. Communications between individual units and division garages in pre-radio operations depended on telephones which frequently failed in severe snowstorms.

Adding two-way radio units to highway department vehicles meant a substantial increase in an already heavy current demand on their electrical systems. Maintaining a fully charged battery, most vital when trucks must operate constantly for hours and days on end during storms, could be possible only by replacing standard d.c. generators with alternator systems. Leece-Neville alternators were placed on most units with the installation of the radios. In addition to supplying always constant power for the radio and other electrical equipment, the alternators eliminated the necessity of two large batteries on some of the vehicles.

In 1955, Ohio's highway department expanded its radio installations and, in the same year, federal civil defense funds were allocated to the department because of the vital role its radio-equipped vehicles could play in time of disaster.

Airplane Used

Statewide installation of the equipment was completed late in 1957, and the department now has 2,112 mobile vehicles with two-way radios. About 1,600 radios are in trucks, the remainder in traffic control and maintenance vehicles and superintendents' cars. Highway Department Director Charles Noble, often uses a state highway department airplane equipped to receive the highway department's two radio frequencies.

The department operates 91 base radio stations, which includes one in each of the state's 88 counties. In addition, 72 portable stations may be operated in any location.

Officials claim that huge savings have been effected by the radio network. While actual amounts cannot be pinpointed, John W. Krichbaum, administrator of communications, points to eight goals which have been reached by the network and which are responsible for the savings:

1. Close and continuous control of all general maintenance and construction.
2. Immediate contact with all district supervisors between headquarters and between district offices, including communications from the air by the director.
3. Coordination and efficient utilization of all personnel and equipment.
4. Coordination of materials.
5. Prompt dispatch and constant contact with snow and ice removal equipment.
6. Constant flow of highway and road condition information including four daily reports from the U.S. Weather Bureau.
7. Direction of and reports from personnel in the event of emergencies. (Highway department radio network may be meshed with those of the state highway patrol and civil defense when necessary.)
8. Immediate reporting of accidents, fires, plane wrecks, flood conditions, etc. (Over 2,000 accident and fire reports were handled by the network within a single year.)

An extensive preventive maintenance program blankets the radio system. All equipment is checked thoroughly—down to every nut and bolt—each 120 days.

Noble, who came to Ohio after service as chief engineer for the new Jersey Turnpike Authority and with more than 35 years' experience in engineering, describes his department radio network as "a big conserver of engineering manpower." He adds, "our only shortcoming in the radio system is that we ought to have more radio connections with police departments, but various technical and FCC (Federal Communications System) problems prohibit this right now."

FROM main office in Columbus radio communications reach out to base stations throughout state.

MAINTENANCE engineer uses car-mounted two-way radio to report clearing of highway after heavy snowfall.

EACH highway department division office maintains a panel truck to field test and service radio units.

COMING EVENTS

Dec. 8-9, New Orleans, La.

Louisiana Safety Association Conference and Exhibit (Roosevelt Hotel). Contact Charles E. Doerler, P. O. Box 1148, Shreveport, La.

Dec. 11, Greeley, Colo.

Governor's Little White House Traffic Safety Conf. (Community Building). Contact Merf D. Evans, director, Colorado Highway Safety Council, Room 14, State Museum Building, Denver, Colo.

Jan. 28-30, Berkeley, Calif.

Eleventh annual California Street and Highway Conference (University of California). Contact Institute of Transportation and Traffic Engineering, University of California, Berkeley, Calif.

March 1-3, Asheville, N. C.

Southern Safety Conf. and Exposition. (Battery Park and George Vanderbilt hotels). Contact W. L. Groth, executive director, Southern Safety Conf. Inc., P. O. Box 8927, Richmond 25, Va.

March 4-5, Philadelphia, Pa.

Twenty-fifth annual Regional Safety and Fire Conf. and Exhibit (Bellevue-Stratford, Hotel). Contact Harry H. Verdier, executive director, Safety Council, Chamber of Commerce of Greater Philadelphia, 121 South Broad St., Philadelphia 7, Pa.

March 16-17, Boston

Thirty-eighth annual Massachusetts Safety Conference and Exhibit (Hotel Statler Hilton). Contact Bruce Campbell, manager, Massachusetts Safety Council, 54 Devonshire St., Boston 9, Mass.

March 17-18, Fort Wayne, Ind.

1959 Northeastern Indiana Safety Conference & Exhibit. Contact Ivan A. Martin, manager, Safety Council, Chamber of Commerce of Fort Wayne, Fort Wayne, Ind.

March 23-25, Los Angeles

Sixth annual Western Safety Congress and Exhibits (Ambassador Hotel). Contact Joseph M. Kaplan, manager, Greater Los Angeles Chapter, NSC, 3388 W. Eighth St., Los Angeles 5, Calif.

April 22-23, Indianapolis, Ind.

Twelfth central Indiana Safety Conf. and Exhibit (Claypool Hotel). Contact Jack E. Gunnell, director, Safety Council, Indianapolis Chamber of Commerce, 320 N. Meridian St., Indianapolis 11, Ind.

Road Watch team at Newburyport, Mass. Registry investigator Fred T. Jones and Capt. Robert F. Jones.

OPERATION ROAD WATCH

Massachusetts road block nets big catch

PROMPTLY at 1 a.m. on a Sunday last August 5,000 uniformed policemen and registry inspectors, wearing white belts and carrying flash lights, fanned out over Massachusetts roads setting up check points. From 1 to 4 in drizzling rain the enforcement teams checked more than 54,000 motorists.

Though warned three weeks before that a surprise statewide road block to catch speeders, drinkers and other violators would be set up, hundreds of motorists cruised into the check points with their guard down. The toll: 842 found driving without a license in their possession, 816 ticketed for defective equipment (mostly defective headlights), 227 moving violations, 87 on-the-spot arrests, 49 license suspensions for driving after drinking and 62 persons locked up for driving under the influence. In addition several stolen autos were recovered, one mental patient was discovered driving without a license and one motorist when stopped had a stiletto lying on the seat beside him.

Said Registrar Clement A. Riley, chairman of the Massachusetts Highway Safety Committee and the person mainly responsible for the plan: "We consider this a worthwhile catch the first time we lowered our net." Six weeks later Riley was able to point to a drop in the percentage of violations. But there were some who didn't like Riley's brand of midnight fishing.

Boos and Cheers

Tavern owners, confronted with a slight drop in after midnight business the night of the check, envisioned rows of empty bar stools from midnight on every night of the week. They began firing letters to Riley. On the constitutional front there were cries that sounded like "detention without representation" and made Riley's Road Watch seem like the Boston Tea Party in reverse.

"A shocking invasion of privacy," editorialized the independent *Athol News*, when the plan was first announced. "Those who take pride in the individual freedom of movement and immunity from unwarranted interference by police cannot have much faith in an official who adopts the theory that the end justifies the means in law enforcement."

But Riley's surprise check was cheered on most editorial pages. Sample (from the independent *Salem News*): "Just as long as motorists refuse to use common sense and risk their own and other people's necks by driving after drinking will it be necessary for police authorities to employ crackdown tactics to make the highways safe. Certain it is that many humans understand only the big whip."

Methodist Bishop John Wesley Lord of the Boston area also came to Riley's defense. In a letter to the editor of the *Boston Sun Globe*, Lord wrote: "Free speech does not give a man the right to yell 'Fire!' in a crowded theater, nor does free driving give the right to any man to place in jeopardy the lives of his fellow citizens. . . . We hope you will do it again and again and again."

Which is just what Riley has in mind. In April he inaugurated a tough "no fix" policy which resulted in 10,000 license suspensions within three weeks. On July 24, when Riley announced Operation Road Watch jointly with Gov. Foster Furcolo and with approval of the Highway Safety Committee, there was no indication it was to be a one-shot affair. The Massachusetts traffic death toll was rising rapidly. By mid-August it was 25 per cent ahead of the year before with 336 fatalities compared to 267 in 1957.

The Road Watch announcement established a program for a series of surprise checks. Enforcement officials were to work in teams with registry inspectors and set up check points at well-lighted areas where they would not create traffic hazards. The teams were to check license, registration, vehicle and operator. The hours chosen, between 1 and 4 in the morning, were calculated to catch motorists

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STOPPING DISTANCES

DRIVER—CAN YOU SPARE A DIME?

WHEN a driver says he can stop on a dime, he means the last dime at the end of a L-O-N-G row of dimes. At 20 m.p.h.—including time for reacting and braking—it takes 47 feet, three car lengths or 846 dimes to stop safely. Including time for perception it takes even longer. Here's the formula:

PERCEPTION + REACTION + APPLICATION = TOTAL STOPPING DISTANCE

PERCEPTION—Awareness of dangerous traffic situation and decision how to handle it. Involves:

Knowledge of accident-causing conditions.

Ability to make decision quickly.

Good physical and mental shape.

Ability to see out of car.

Attention to job of driving.

(Perception time not included in chart.)

REACTION—Time between making up mind to brake and getting foot on brake pedal.

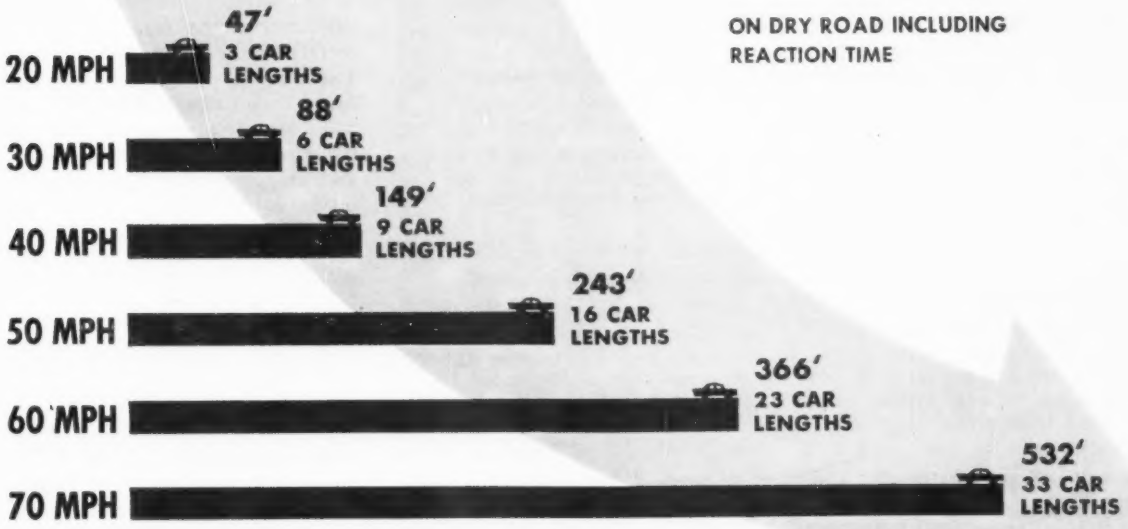
APPLICATION—Execution of decision to apply brakes. Involves:

Physical coordination.

Ability to operate brakes.

Wasted time here means trouble an instant later. Actual braking does not occur until brake shoes are in firm contact with brake drums. Firm, steady contact must be held until car stops.

AVERAGE STOPPING DISTANCES FOR PASSENGER CARS



BRAKE-ANALYSIS

THREE WAYS TO STOP

1 Collision with moving or stationary object. Indicates a careless driver. Perhaps he neglected upkeep of his brakes or never learned how to judge a safe stopping distance.

2 Locking wheels and letting road surface do the rest. Sign of inattentive or hard riding cowboy driver who runs chance of skidding and loss of steering control. With wheels locked car is stopped by friction between wheels and road. **Ability of road to grip car wheels—retarding auto's advance—is called road's coefficient of friction.**

3 Letting brake shoes do the job without locking wheels. Mark of a smooth operator. **Determining factor here is braking force of car—friction between brake shoe and drum.** Uniform Vehicle Code recommends that cars have braking force of 52.8 per cent of their gross weight (equivalent to a 20-foot stop after brakes are applied at 20 m.p.h.). **Best braking force is achieved just before wheels lock.** Ease up on the pedal—even in emergency just before locking—or car may skid and steering control may be lost.

FOR STOPPING FINESSE

Engine may be used as brake, especially in low gear. Takes load off brakes in mountains and hills and prevents fading.

Observe posted safe speed when entering curves. Conditions ahead are hidden and driver should be prepared to stop.

Pump brakes gently on slippery roads. It takes longer to stop but skidding is prevented. Begin pumping as early as possible.

Don't over drive headlights. Be able to stop within headlight range if emergency develops.

Reduce speed drastically on snow and ice because of increased stopping distances. Snow tires help somewhat but best protection, especially on glare ice, is reinforced tire chains.

When first driving car with power brakes, test them at low speed to get feel of new system. Guard against over braking. When switching from power to normal don't under brake.

If collision can't be avoided and there's a choice of targets, choose one with most "give." Just a little "give" helps a lot.

EMERGENCY BRAKE

UVC recommends that in addition to service brakes, car should be equipped with another means of applying brakes to at least two wheels. This extra hand brake should always be included in brake check.

FACTORS

which affect stopping

Speed—If excessive, brakes may fade out completely. At 40 or 50 mph, some roads, especially when wet, have only half coefficient of friction as at 10 mph. Affects gripping power of gravel, cinders, snow, ice or muddy pavement very little. **Weight**—if car is overloaded, brakes may prove inadequate. **Tires**—Smooth treads decrease gripping ability slightly on ordinary pavement, more on wet. Recent tests show reducing pressure in winter does not affect stopping distance. **Chains**—On ice or snow roughly double coefficient of friction. Reinforced chains are best.

Highway Debris—Water on cement concrete, particularly with oil drippings or on many bituminous surfaces, increases stopping distance (oil on wet cement concrete with heavy traffic more slippery than on many asphalt pavements). However water on gravel or cinders may reduce stopping distance. Loose gravel on hard surface may act like ball bearings, cutting gripping power in half. Dirt may act like soapy film in rain—but dirt or cinders on ice will reduce stopping distance.

Texture—Gritty surface better than very smooth. But traffic gradually polishes sharp edges, deposits oil and hence increases braking distance. **Temperature**—Makes big difference on ice and snow—at 20 mph average braking distance is 120 feet when mercury is near zero increasing to average of 225 feet when near 32 degrees. **Slope**—Stopping distance is lengthened downhill, shortened uphill. Speed should be reduced at crest of hill to stay on safe side of possible danger.

NSC Christmas Emphasis

DRY UP THE OFFICE PARTY

THE office party with its flowing bowl was blamed by the National Safety Council for boosting the Christmas traffic toll.

"Either dry it up or cut it out," the Council urged business and industry.

Surveys made by the Council indicate that a sizeable percentage of Christmas traffic accidents occur in the early hours of the holiday period. Many of these can be traced back to the office party and its highball hilarity.

"This is no effort to dampen the traditional Christmas spirit," the Council emphasized. "It is a practical attempt to eliminate a definite source of death and destruction on the highway at a time they hurt the most—the Christmas season.

"But don't forget — drinking and driving are a lethal combination any time, anywhere, and not just in connection with the Christmas party."

Keep Cork in Bottle

The Council is asking its 8,000 business and industrial member concerns to take a new look at their office parties and either keep the cork in the bottle or eliminate the parties.

The Council emphasized the tragic irony of celebrating a holiday dedicated to 'Peace on Earth, Good Will Toward Men' and then sending people out on the public highway in a condition to injure or destroy their fellow men.

The Council is enlisting the support of churches of every faith and creed in a united effort to keep the threat of drinking drivers to a minimum over the Christmas holiday season.

"There is no better place to apply practical religion than behind the wheel of a car," it said, "and certainly today's traffic is an ideal place to demonstrate the true Christmas spirit of sharing with others.

"We appeal to every driver to stay away from the wheel after drinking, and to every pedestrian to stay out of the street when he isn't in full possession of his faculties.

"The most dangerous drink ever concocted is 'One for the road.' Turn it down. You'll live longer—and so will the other fellow."

News from Capitol Hill

While legislators were home campaigning, traffic safety events along the Potomac included a rumbling, a reminder and a continued upward trend downward.

Congressman Roberts Speaks

"I, frankly, am tired of hearing that our drivers are delinquent, alcoholics and incompetents," said Congressman Roberts, chairman of the House Subcommittee on Traffic Safety. "I was not long in being convinced, on the basis of the evidence we had seen, that Detroit was not turning out the safest possible product." Roberts made the remark recently, indicating that he would press H.R. 10,832 during the next session of Congress. The bill would require that every motor vehicle transported in interstate commerce meet certain safety standards established by the Secretary of Commerce. Roberts added that if the Federal Government's purchase specifications prescribed certain safety specifications for its motor vehicles, such safety devices might become standard equipment on all cars.

Interstate Commerce Commission

The ICC has admonished truck fleet owners that in truckleasing arrangements the lessee is responsible for compliance with all of ICC's Motor Carrier Safety Regulations, including those relating to records, hours of driving and safety equipment. The ICC also announced a proposal to amend the regulations with respect to brakes required on trucks and truck-tractors having three or more axles and in connection with the requirement that all brakes be operative.

Upward Trend Downward

The Federal Highway Administrator estimates that motor-vehicle registrations in the United States are expected to reach 68,398,000 for 1958. The projected total is a 1.9 per cent increase over last year—a continuation of the downward trend of the last few years in overall annual increases.

MORAL EMPHASIS PROGRAM GAINS MOMENTUM

Traffic safety's fledgling church activities group spreads wings — conducts five statewide and numerous citywide programs in first two years

AT THE National Safety Congress, prominent Protestant, Catholic and Jewish clergy and lay leaders met together to discuss the moral aspects of safety. They were members of a national committee of religious leaders for safety which includes Rev. Bernard Braskamp, Chaplain of the House of Representatives, Washington, D. C., Robert Cadigan, editor of *Presbyterian Life*, Philadelphia, Pa., Erwin D. Canham, editor of *Christian Science Monitor*, Boston, Mass., and the Very Rev. Msgr. George Higgins, a director of the National Catholic Welfare Conference, Washington D. C.

The 50 were the first members of a projected 100 man National Committee of Religious Leaders for Safety, an advisory committee to the National Safety Council's thriving young Church Activities Division. Not yet two years old the church division had already overpowered skeptics who believed religious exhortations to drive safely would be treated as puritanical warnings from pulpit bogeymen.

To the division's credit: five governors had officially called statewide Safe Driving Sabbaths in their states, several mayors had done the same in their cities and church leaders had become an integral part of traffic safety Americana.

The moral driving or "Thou shalt not kill" crusade was conceived two years ago in the mind of retired financier Sherburne Prescott of Greenwich, Conn. Prescott, founder and guiding spirit of the Greenwich Safety Council, invited church leaders to his home in September 1956 to plan a safe driving crusade for the following October. Prescott was so pleased with the outcome he made a $75,000 grant to NSC in the hope the crusade could be fostered throughout the nation.

In March 1957, NSC set up the Church Safety Activities Division under the chairmanship of Louis B. Seltzer, editor of the *Cleveland Press*. Appointed secretary and director of the new division was John T. Kenna who has since personally carried the NSC-sponsored crusade into 22 states and the District of Columbia.

Governors of Connecticut, Nebraska, North Dakota, Minnesota and Illinois called in NSC to help set up statewide meetings of key clergymen to plan Traffic Safety Sabbaths. At the meetings long-range plans were made to include religious leaders in each state's traffic accident prevention programs. Several cities also sent out appeals to the Church division, including Akron, Ohio, Portland, Ore., Seattle, Wash., Lincoln, Neb., Chicago and St. Joseph, Mo. By the time of the Congress this year the moral emphasis safety program had found its way into all states in the union and several foreign countries in the form of NSC field counsel or materials.

When formed, the Church division began adding program aids to the Council's voluminous safety aid service and has produced 20 so far. Selected safety prayers, sermon outlines, scripture references, statements by councils of churches and bishops and other materials were mailed out in the thousands. The division also made available "morality of safety" materials produced by other agencies. It distributed 2,000 copies of a small anthology of prayers, poems and articles, "He Rides Beside You," edited by Dan Hollingsworth and Ona Bel-

TYPICAL of the religious sessions at the Regional Conferences is this one at Chicago's Sherman Hotel.

knap and helped spread 12 million copies of Prescott's "Motorist's Prayer" throughout the world.

In 1958 church leaders got a chance to show their enthusiasm for the new movement. The President's Committee on Traffic Safety asked the Church division to invite religious leaders to four Regional Citizens' Leadership Conferences held this spring in Atlantic City, Chicago, San Francisco and Miami. Responding to the call were 370 ministers, priests and rabbis from every state and representing 50 denominations. They formed 10 per cent of the total conference attendance.

There was also a stirring on the national denominational and interdenominational level. Pronouncements labeling the traffic accident as an enemy of the social order were issued by the Protestant Episcopal Bishops, the Roman Catholic Hierarchy, the Greek Archdiocese of North America, the United Christian Youth Movement (youth arm of the National Council of Churches), the Synagogue Council of America and several other groups.

Reflecting its acceptance as part of the war on traffic accidents, the morality of safety idea began getting wide press coverage in religious and secular periodicals and newspapers. Associated Press correspondent George Cornell covered the movement in a feature story for AP client papers coast to coast. And the Outdoor Advertising Association of America sponsored thousands of billboards which reminded the public that "You are Morally Responsible for Safe Driving."

As its own reminder, the Church division took the phrase, "Therefore, Choose Life," from Deut. XXX:19. Commenting on the biblical motto which appears in the division's quarterly news letter, a clergyman said a free society respects, reveres and chooses life, whereas an immoral society, in bondage or ignorance, shows by contempt of life and dignity, defiance of God and His Will.

When the Greenwich religious leaders met two years ago they did indeed choose life. Perhaps they didn't realize it at the time but that life—on the highway at least — would soon be championed by five governors, several city mayors and a new and vigorous traffic safety movement.

The denominational diversity of the gathering is shown in this panel composed of Rabbi Jacob Singer, Temple de Hirsch, Dr. Martin L. Goslin, Plymouth Congregational Church, Rev. Francis J. McGarrigle, S.J., Seattle University and Rev. Willard A. Backer, Maple Leaf Evangelical United Brethren Church (all of Seattle).

Good Press in Seattle

WHEN the Seattle-King County Safety Council sponsored a moral emphasis safety program this fall it caused quite a stir.

Local media—four television stations, two dailies and several weeklies and radio stations—plugged the conference with great enthusiasm.

It also rated national attention. Commented *Time* magazine:

"The spiritual side of driving a car came in for intensive study in Seattle last week at the first of what the National Safety Council hopes will be a nationwide series of 'moral-emphasis safety workshops.' Some 250 laymen and clergymen from the Puget Sound area—including Protestants, Roman Catholics, Greek Orthodox, Jews and Buddhists—met to discuss ways and means of awakening the conscience of the man behind the wheel."

According to Bill Feathers, Seattle-King County Safety Council manager, the council received more favorable comment on the moral emphasis program than any other.

The media interest shown in Seattle is typical of reaction to such programs throughout the nation. Of special interest were an Associated Press feature story by George Cornell which attracted wide attention and features in *The Reader's Digest* and the *Christian Science Monitor*.

MORTAR BOARD PATROL FOR TRAFFIC POLICE

By Gerald O'Connell

Public support groups, business associations and individuals itching to get into the traffic safety battle on the home front may have an ideal project panting for attention right at their doorstep — helping the police department finance its training program. But to do a job they should know a few facts about such training and how support groups and businessmen are getting the job done in other cities. Mr. O'Connell gives us a fast and interesting count down.

Traffic police training should be a planned and continuing effort to assure acceptable job competence in an assigned activity. It is but one "tool" in the administrator's work box.

No one should fight us here. The definition fits about every kind of job.

The citizen and police official are agreed that we must continue to attract competent men with needed qualifications for police career service and then give them thorough indoctrination for traffic duty.

Where many departments today are falling on their collective faces is in their concept of what constitutes traffic training and indoctrination. It is too often treated as a "one shot" project carried on when the man is hired. This initial and often final burst of training many times utilizes the "telling about" technique of instruction which is usually satisfying only to the instructor. The more desirable teaching methods, those involving "telling — showing — doing," are not used. Result: a nebulous concept of the traffic control job.

In most larger departments over the years one or more officers have become experts in the many subjects which officers need to know. The effective use of this knowledge was instrumental in establishing training as an administrative tool. However, recognition of the need for training a larger number of men in a department has been slow to emerge despite the continuing increase in automobile use everywhere. There has also been delay in adopting companion requirements such as organizational changes needed to assure a continuing corps of trained personnel.

For acceptable work at the operation level there must be skill and purposefulness at supervisory and command levels.

The good police administrator has an understanding of what police training is, its purposes, how much time it requires, effective methods, and essential levels of training.

If training is brushed off lightly, rookie officer Harlan Miller must learn his responsibilities and what is acceptable performance on his own in a hit-or-miss fashion. He learns by his mistakes, or by watching how others do the job and by imitating what he thinks is most effective. This type of training takes time, costs money, and citizens often are victims of his mistakes.

What constitutes good training?

Traffic police training does much more than prevent the repetition of mistakes or errors such as Rookie Officer Miller might commit. It defines duties, instills enthusiasm, develops proper skills, habits and attitudes. It also inspires devotion to the job and loyalty to leaders.

A good program collects, sorts and organizes the best experience of thousands of police officers gained over a period of years. In one way or another, and there are many, this organized body of knowledge is passed on to those who need it. In this way training improves the performance of police generally and prevents the many mistakes or failures so detrimental to acceptance for the traffic accident prevention program of the city.

Training of traffic police personnel is often hamstrung by the belief held by the chief or traffic administrator

Gerald O'Connell is director of training for the Northwestern University Traffic Institute.

that a group of officers must be assembled in a classroom to complete training. Since he can't get a classroom, his men and the public are cheated of proper training.

There are many ways effective training may be offered. One method originating in California and now used in many other areas is termed "roll call" training. Its main features are continued careful study of knowledge needed by the officer in his particular job, called job analysis, and a continued program of spooning this information to officers in bite sizes.

This is how it works.

A single problem area where training is needed is examined. It may be new traffic legislation. Officials of the department prepare a training bulletin directed to the officers which stresses "what an officer should know and what he should be able to do." Each officer receives a copy of the bulletin at roll call and is told to study it. At the following roll call the subject is discussed and questions cleared up. This method assures uniformity of information and is an official guide to action.

Supervised reading and field performance experience is another way to train men.

In Kansas City, Mo., the department has a policy of developing "coaches" who are assigned to the job of field training new men after they leave training classes. The coaches are highly trained and competent and receive added compensation for this important work.

Planned rotation of assignment among traffic functions is another method of training. This diversification of experience acquaints officers with the wider range of supervisory needs.

The various levels of responsibility for traffic control within the department require different training techniques. The discussion method is often a better way to train command officers than the lecture method. The wider the range of methods the more effective the training will be.

The four primary training areas are:

Recruit training — given to men coming into police service, preferably before they are put on duty.

In-service training—keeps men up to date, abreast of the latest advances in techniques. Men should receive a minimum of 75 hours of such planned training every year.

Supervisory training—for men in supervisory posts or about to reach such positions. Given to develop administrative know how.

Specialized training—for selected men in service functions such as analysis of record data, preparation of training materials, directing use of chemical tests, traffic law, or driver improvement.

There are many publications on the basic police traffic functions of direction and control, accident investigation, traffic law enforcement, and support services. By their use suitable training programs can be formulated at most levels.

AN ACTION PROGRAM FEATURE

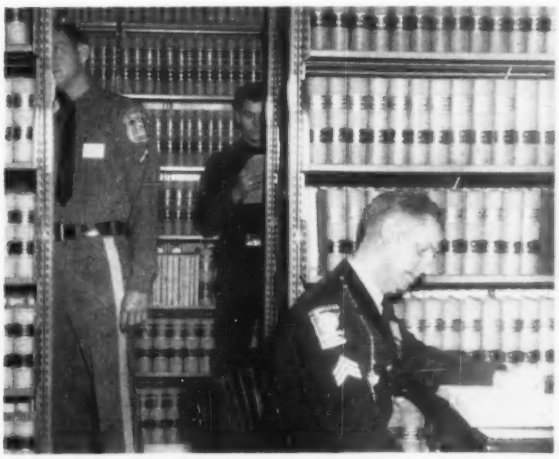
Department attitude can be a stumbling block for the traffic training program.

How the training program is planned, and those taking part in it, is important.

The content of a traffic training program shows the officer receiving it how he is to perform and implies that such performance will have the approval of his superiors. But unfortunately, when the heads of the department have not participated in the selection of course content, or have not reviewed or approved the content of training proposed by a training agency, there can be trouble.

For example, in one city an officer was given intersection control duty his first day back from a training course. He was using hand and arm signals taught to him by instructors at the school. His sergeant was an old-timer who had never had police training of any kind.

After two hours the young officer



WHEN attending university course traffic policeman finds his ivy league beat includes some library duty.

SEVERAL universities hold special traffic training courses. Author O'Connell lectures Northwestern class.

Traffic training pots o' gold waiting to be tapped in all communities

was called from his post and laced down by the sergeant for not knowing enough to give the proper signals for a left turn movement. They argued, but the old sergeant won out because his way—the old way and quite inferior—had been used in the department for years.

This is what hobbles efforts to upgrade police training — lack of agreement on what a man is to do.

The department's traffic training sessions are based on the "material available." They fail because the man gets interesting but not "must know" instruction.

Programs have limited content. Understanding the relationships between police traffic control activity and the work of other official groups is necessary. In many training efforts this relationship and dependency upon one another's efforts is not discussed. Police are not taught the importance of their contribution to the statewide driver improvement program, the how and why of traffic engineering work and its relation to accident prevention and enforcement activity, or the important role of traffic safety education.

There can be opposition to traffic training by both officers and department officials. Officers resist traffic training when it must be completed on their own time. Officials resent too many men being pulled out of service for training—particularly if the department is undermanned.

Police officers should *not* be forced to attend training sessions on their own time, and the chief has a justifiable right to resist training programs which pull needed manpower from the streets. The men should be paid for their own time spent in required job training, or be given equal time off.

Your department may need financial help to upgrade its traffic training program. Here's how support groups, industry and individuals have helped.

The Chief of Police of Decatur, Ill., encouraged the businessmen who had been contributing to police welfare by buying ads in police publications and responding to other appeals, to contribute instead to a police training fund. This fund was administered by the president of the bank, the city prosecutor, and the chief. Contributions were adequate to send men to the FBI's National Police Academy, and to the Traffic Institute and other area training schools each year.

In Buffalo, N. Y., a retiring traffic captain learned that a testimonial dinner was being planned in his honor. He requested that rather than honoring him at a dinner, those interested should contribute to a training fund. Specialized training is now paid for by this fund.

The Esso Safety Foundation provides training grants to selected departments in its marketing area. The fund covers tuition, travel, meals and housing expenses for selected officers.

Divisions of Allstate Insurance Co. in California, Washington and New York have similiarly provided grants in aid for traffic training.

Many civic organizations and business groups have found that helping local police departments to upgrade traffic control personnel through training is a worthwhile contribution to traffic safety. Here are a few groups who have engaged in this type of project:

The Civitan Club, Washington, D.C.; Union League Club of Chicago; Junior Chamber of Commerce, Duncan, Okla.; New Car Dealers Association of Cincinnati, Ohio; the motor clubs of Chicago, Cleveland, and New York; the General Finance Corporation; and a pioneer in this activity, the Kemper Foundation for Traffic Training.

The Citizens Traffic Safety Board of Chicago and the Traffic Safety Association of Detroit also provide

To Page 43

TRAFFIC training is never done. Statisticians' charts regularly pinpoint new problems for police to meet.

ENGINEERS, acting on changing traffic needs, devise new methods of car control which police must master.

List of Traffic Short Courses

January, February and March, 1959

January 5—Introduction to Police Management (to February 6), Northwestern University Traffic Institute, Evanston, Ill.

January 5-9—Motor Fleet Supervisor—Province of Quebec Safety League, Montreal, Canada. Contact: Paul Leboeuf.

January 19-30—Police Traffic Training Course — University of California, Berkeley, Calif.

January 22-23—Western Region In-service Conference for Graduates of the TPA Training Program and Their Chiefs, Oakland, Calif.

January 26-30—Traffic Court Conference—University of California School of Law (in cooperation with American Bar Association), Berkeley, Calif.

February 23-March 13—Police Traffic Records—Analysis and Use of Data—Northwestern University Traffic Institute, Evanston, Ill.

February 23—Effective Fleet Operation (12 consecutive Monday evenings). Northwestern University Traffic Institute, Evanston, Ill.

February 26-27—Southern Region In-service Conference for Graduates of the TPA Training Program and Their Chiefs, Memphis, Tenn.

March 2-6—Motor Fleet Maintenance—Ontario Safety League, Toronto, Canada. Contact: Frank C. De Venne.

March 2-20—Traffic Engineering Seminar—Northwestern University Traffic Institute, Evanston, Ill.

March 9-10—Motor Fleet Supervisor—University of California, Los Angeles, Calif. Contact: Bob Glenn.

March 11-13—Motor Fleet Maintenance—University of California, Los Angeles, Calif. Contact: Bob Glenn.

March 16-17 — Motor Fleet Supervisor—University of California, Berkeley, Calif. Contact: Bob Glenn.

March 16-20 — Chemical Tests for Intoxication—Northwestern University Traffic Institute, Evanston, Ill.

March 16-27 — Training Methods and Programs — Northwestern University Traffic Institute, Evanston, Ill.

March 18-20—Motor Fleet Maintenance — University of California, Berkeley, Calif. Contact: Bob Glenn.

March 23-25—Motor Fleet Maintenance—University of Washington, Seattle, Wash. Contact: Fred H. Rhodes, Jr.

March 23-27—Traffic Court Conference—Yale University. (in cooperation with American Bar Association), New Haven, Conn.

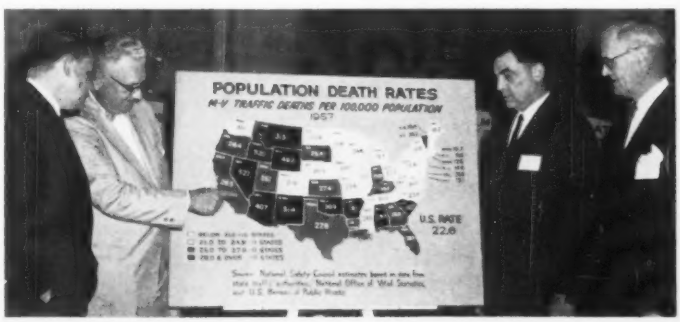
March 23-27 — Motor Fleet Supervisor — University of Oklahoma, Norman, Okla. William Hartman.

March 30-April 17—Accident Investigation — Administration and Techniques — Northwestern University Traffic Institute, Evanston, Ill.

Wind Up Legislative Conferences

State legislators are getting "the word" on traffic safety this fall at four regional conferences. Meetings have already been held in Atlanta, Boston, and Chicago. The final conference will be conducted in Salt Lake City from December 7 to December 10.

Each conference begins with an evening get-together, followed by two-and-a-half days of discussion on all phases of traffic safety. The project is sponsored by the President's Committee for Traffic Safety and the Council of State Governments and conferences are conducted by the Traffic Institute of Northwestern University with assistance from other national organizations.



CONFERENCE planners studying exhibit are: (l. to r.) J. W. Bethea, executive secretary, President's Committee for Traffic Safety; Robert E. Raleigh, conference director, Traffic Institute, Northwestern University; Ray Ashworth, director, Traffic Institute; Theodore G. Driscoll, assistant director, Council of State Governments.

BOOSTERS

USE THESE AIDS . . .

Here's Help for Police Traffic Training Programs

FILMS

Traffic Police, showing how effective traffic law enforcement depends upon trained personnel (16 mm sound color six min.) and *The No. 1 Lifesaving Challenge in America Today*, demonstrating 30 years of progress in accident prevention (16 mm sound color 17 min). Both in series of Action Program films by the President's Committee for Traffic Safety. Write President's Committee for Traffic Safety, General Services Bldg., Washington 25, D. C.

Series of 10 police traffic training films produced by the National Association of Automotive Mutual Insurance Companies in collaboration with the Traffic Institute of Northwestern University. For descriptive flier (Pub. No. 2156, "A Training Program on Film") write to Traffic Institute, 1704 Judson Ave., Evanston, Ill. or Dallas Jones Productions, 1725 N. Wells St., Chicago 14, Ill.

Reckless or Wreckless—Work of state police patrols in curtailing highway fatalities. (16 mm sound motion color 10 min. TV/OK from MFA Mutual Insurance Co. and Missouri State Highway Patrol, Columbia, Mo.)

Report on 635—Training of highway patrolmen and how that training is used later on duty. (16 mm, B&W 26 min. TV/OK from North Carolina Dept. of Motor Vehicles, Raleigh, N. C.)

State Trooper—Shows how use of modern scientific aids in State Police Departments improve performance of troopers. (16 mm sound motion B&W 15 min. from McGraw-Hill Book Co., Inc., Text-Film Dept., 330 W. 42nd St., New York 36, N. Y. and University of Illinois Visual Aids Service, Div. of Univ. Extension, Champaign, Ill.)

NSC AIDS

The Council has produced several materials suitable for police traffic training. These include Public Safety Memos on accident records and reporting, manuals on city and state traffic accident records, traffic accident record forms, publication of talks by experts in traffic safety at the National Safety Congress and TRAFFIC SAFETY magazine, a monthly periodical which carries a wide range of articles of interest to all in the safety field. Membership in NSC brings with it TRAFFIC SAFETY magazine and the annual publication of Accident Facts, a comprehensive listing of all accident statistics.

TRAFFIC INSTITUTE AIDS

The Traffic Institute of Northwestern University publishes several police training materials. Included are *Traffic Accident Investigator's Manual for Police*, the *Traffic Law Enforcement Manual Series* and several other publications dealing with specific training topics. Write to Traffic Institute, 1704 Judson Ave., Evanston, Ill.

OPERATION SAFETY KITS AND MATS

Kits and mats on seasonal traffic safety themes are available from NSC. Single kits are free. Mats are free up to ten—additional mats are .10 each. See Booster page of past issues of TRAFFIC SAFETY for listing of Operation Safety themes.

Spread The Facts With Reprints

Bright, up-to-date and inexpensive fact sheets began appearing in TRAFFIC SAFETY five months ago. They're all available in reprint form.

Slipped in pay envelopes, used as handouts at meetings or give-aways at service stations and other business places, they're guaranteed to keep people pleasantly aware of ways to save their lives. Eleven TRAFFIC SAFETY fact sheets, including the one in the current issue, have appeared to date:

Light Up Your Traffic Hazards (329.96-1)
Boat Trailers (329.96-2)
Driver Improvement Schools (329.96-3)
Traffic Law Uniformity (329.96-4)
Use of Turn Signals (329.96-5)
Holiday Hazards (329.96-6)
Your Responsibility in an Auto Accident (329.96-7)
The Driver with a License to Kill (329.96-8)
Drinking and Driving (329.96-9)
Driver Education in High School (329.96-10)
Stopping Distances (329.96-11)

Order by fact sheet title and stock no., e. g. Boat Trailers (329.96-2). NSC reprint prices: packages of 50, $3.90; 100, $5.35; 500, $15.00. Subject to 10 per cent member discount.

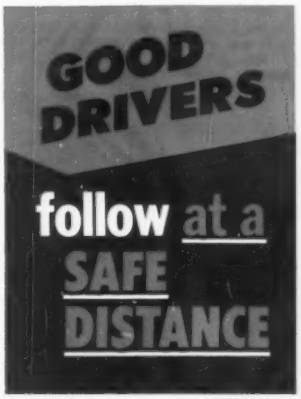
IN YOUR ACTION PROGRAM MATERIALS

Traffic Safety Aids

ENFORCEMENT—A VITAL KEY (329.16) Enlisting support among community leaders for your traffic safety program is essential to the success of your project. These leaders can, in turn, alert the entire community to the local traffic needs. But first, they must be informed. This leaflet is one of a series of three aimed at local civic leadership. Sold in packages of 100. Price per pkg.: 1-9 pkgs., $2.90; 10-49 pkgs., $2.50; 50-99 pkgs., $2.30; 100-199 pkgs., $2.20; 200 or more pkgs., $2.10.

DO A GOOD TURN—WAIT (391.45) This popular leaflet is for the walking and driving public. It is designed to promote better driver-pedestrian relationships and develop good driving habits. Sold in packages of 100. Price per pkg.: 1-9 pkgs., $2.50; 10-49 pkgs., $2.00; 50-99 pkgs., $1.80; 100-199 pkgs., $1.60; 200-999 pkgs., $1.40; 1,000-1,999 pkgs., $1.20; 2,000 or more pkgs., $1.00.

TRAFFIC POSTERS FOR MARCH POSTING



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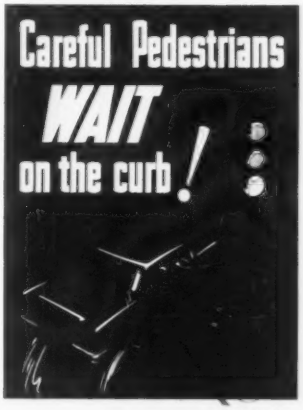

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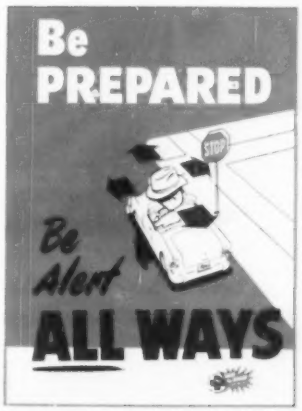


T-1257-C 25"x38"
T-1258-A 8½"x11½"

T-1267-B 17"x23"

PRICES FOR ABOVE POSTERS

Traffic Posters—T-prefix to number	1-9	10-99	100-999	1000-4999*
A Size	$0.15	$0.092	$0.063	$0.052
B Size	.25	.18	.15	.12
C Size	.35	.27	.22	.20

YOUR CREDIT LINE can be imprinted at time of the press run on Traffic B and C posters only. Orders for imprints on March posters above must be received by January 15, 1959.

Imprinting charges for these posters are $2.25 per lot plus an initial charge for each electroplate of $21.00 for C poster imprint and $12.50 for B poster imprint.

*Write for prices on quantities of 5,000 or more or for special rates on annual poster orders.

PRICES SHOWN ARE SUBJECT TO A DISCOUNT OF 10% TO NATIONAL SAFETY COUNCIL MEMBERS.

FLEET POSTERS

POSTER PRICES

Posters illustrated on these pages are included in the automatic Motor Transportation poster services. Automatic poster sets are available on yearly subscription that provides (4) subjects per month viz. (2) "A" size (8½"x11½")and (2) "B" size (17"x23"). Automatic service is provided in the following categories:

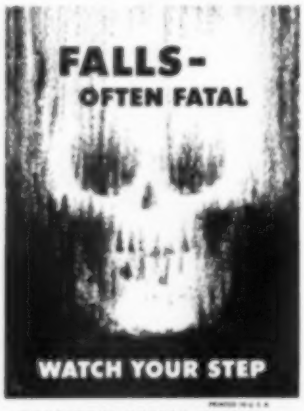
City Truck	City Bus	Annual price 1-4 sets, $8.85 per set;
Intercity Truck	Intercity Bus	5-49 sets, $7.65 per set; 50 or more
Sales Truck	Taxicab	sets, $5.95 per set.
Truck Terminal	Bus Terminal	

Posters are available for individual selection at the following prices:

	1-9	10-99	100-999	1000-4999*
A size, any selection	.15	.092	.063	.052
B size, any selection	.30	.22	.185	.15

All prices shown are subject to a 10% discount to National Safety Council Members.
*Write for prices on quantities of 5,000 or more.

V-0955-B 17x23



1406-B 17x23

0081-A 8½x11½

1478-A 8½x11½

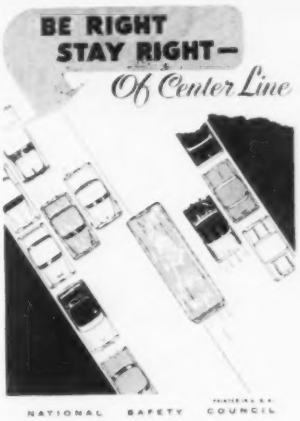
1007-B 17x23

9040-B 17x23

1342-A 8½x11½

V-1514-A 8½x11½

V-1513-A 8½x11½



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V-9818-A 8½x11½

V-0634-A 8½x11½

V-8480-A 8½x11½

V-0696-A 8½x11½

V-0635-B 17x23

V-0839-B 17x23

STUDENTS SHOW DRIVING SKILL AT SCHOOL BUS ROADEO

North Carolina event attracts skilled students to bus driving job, promoting a student-driver program that has paid off in safety and economy.

by Wallace N. Hyde

WITH a fleet of 8,023 school buses, transporting more than a half million school children daily, North Carolina operates the largest fleet of public owned buses in the world.

One of the unusual things about this pupil transportation system is that approximately 90 per cent of the buses are driven by high school students. In many states, public officials as well as the public at large would view this situation with considerable alarm. In North Carolina, however, we are not disturbed. In fact, we are quite proud of the safe and efficient manner in which the students have executed this responsibility.

In addition to providing a comparatively safe school transportation system, the use of students as school bus drivers gives the taxpayers a considerable financial break. The base state salary for a school bus driver in North Carolina is $25 per month. It is obvious that an adequate supply of competent adult drivers could never be employed at this salary. If an attempt were made to hire adults only, it is readily apparent that most of them would be totally unsuitable for the job. On the other hand, inasmuch as students can drive a school bus without interfering with their school activities, it is usually possible to employ the best qualified students.

We feel that there are three distinct advantages to be gained by using student drivers: (1) the best qualified students can be employed, whereas only a few well-qualified adults can be hired at the minimum salary usually offered, (2) the use of student drivers makes it possible to conduct a more extensive training program, and (3) students are much easier to supervise than adult drivers.

Of the three advantages, the first is probably the most significant. In recent years, primarily because of competition from other types of part-time employment, school officials have found it increasingly more difficult to employ the best qualified students. In many cases, students can find employment after school and on the weekends that will pay them as much in one week as driving a school bus would pay them in one month.

Search for Prestige

This situation has encouraged many of us in recent years to search for some method of improving the prestige of the school bus driver and making the job more attractive to the better qualified students. With this objective in mind, a school bus roadeo for student drivers was inaugurated during the 1955-56 school term under the auspices of the Governor's Traffic Safety Council. The roadeo is patterned, to a great extent, after the national professional truck driver's roadeo, sponsored by the American Trucking Association.

The competition is made up of two divisions—one division for the girls and one division for the boys. In the process of selecting the state champions, the outstanding senior girl and boy drivers of each of the approximately 900 high schools in the state are selected by well-defined criteria established by a committee of 12

RECEIVING scholarship award is Bernard Lennon. L to R are Jeff Wilson, N.C. Motor Carriers; Dr. Hoyat Blackwell, Lennon, Wallace Hyde.

Wallace N. Hyde is director, driver education and accident records division, Department of Motor Vehicles, North Carolina.

FINAL CONTESTANTS in state boys' division wait before starting their driving skill road run.

GIRLS' DIVISION takes written examination in the state roadeo before their driving skill road run.

county superintendents. These criteria are as follows:

- Skill of driver in operating bus.
- Courtesy as related to passengers and other motorists.
- Ability to maintain discipline and handle any such problems that arise in a normal course of his duties.
- Employment of safe practices in all phases of discharging his duties as a school bus driver.
- Cleanliness and mechanical condition of bus throughout the entire school year.
- Driving record as it pertains to the operation of vehicles other than the school bus.
- Number of days absent from assignment as school bus driver.
- Personal philosophy of responsibility as a school bus driver.
- Ability to get along with students, mechanics, principal and others with whom he comes in contact in the course of discharging his duties.
- Scholastic record.
- Consistency in maintaining schedule.

The two drivers selected to represent each high school compete in one of 30 district roadeos held throughout the state during the final two weeks of the school term. The district roadeos consist of a one-hour written examination and a test of driving skills as determined by several complicated maneuvers set forth in an intricate skill test layout.

This layout, which would provide sufficient challenge for professional truck drivers, was developed by Tom Moore, safety director of Carolina

Turn Page

ONE-INCH clearance was required on each side of the dual wheels for the straight line driving test.

ONE FINALIST starts through the precarious diminishing clearance test toward the stop line.

Freight Carriers Corp., Cherryville, N. C., in cooperation with employees of the driver education and accident records division of the North Carolina Department of Motor Vehicles. For a number of years Moore has served as a judge in the Annual National Roadeo of the American Trucking Association.

At the end of the school term, the 60 district winners, 30 boys and 30 girls, are brought to the Institute of Government at the University of North Carolina for the state roadeo. This two-day event culminates in the selection of two state champions and two second-place winners. The state roadeo includes three major areas of testing: a one-hour written examination, a 45 minute road test in traffic and a skill test very similar to the one used in the district roadeos with the exception that a number of additional problems are added.

Scholarships to Winners

In its initial year, the winners of the district roadeos received numerous awards provided by local sponsors. In addition to local awards, $500 scholarships were awarded the two state winners. These scholarships were made available by the North Carolina State Motor Club of Charlotte which also contributed funds to defray the expenses of the state roadeo. Trophies for the district winners were presented by the Pilot Life Insurance Co. of Charlotte. The North Corolina Motor Carriers Association of Raleigh provided trophies for the two state winners. Members of the personnel and safety council of the same organization served as judges.

At the conclusion of the roadeo, an awards banquet was held for contestants, roadeo officials, public school officials and sponsors.

The roadeo proved to be such a tremendous success in its initial year that the awards offered were increased the second year. To make this possible, a contribution of $1,000 was obtained from the North Carolina Motor Carriers Association to match a similar contribution being made for the second year by the North Carolina State Motor Club. With the $2,000 contributed by these two sponsors, it was possible to award scholarships of $500 to the two first-place winners and $200 scholarships to the two second-place winners. The remaining $600 was used to pay expenses of the state roadeo.

At the conclusion of the second year, the awards were again increased to make the program more attractive at the local level. To accomplish this goal and to make it possible to offer $100 scholarships to all 60 district winners, five new sponsors—Home Finance Group, Inc., Charlotte; Perley A. Thomas Car Works, Inc., High Point; North Carolina Chain Store Council, Raleigh; Pilot Life Insurance Co., Greensboro, and Hackney Brothers Body Co., Wilson — were added each contributing $1,000. Numerous other local sponsors contributed scholarships ranging in value from $100 to tuition scholarships of $250. A total of $8,000 in scholarships was awarded at the conclusion of the third annual roadeo held June 16-17, 1958, at the Institute of Government.

The two state winners received a total of $600 in scholarships. In addition, they were guests of the annual Pupil Transportation Conference —a three-day event held at Carolina Beach, one of North Carolina's leading beach resorts. The two second-place winners, including the district award winner, received scholarships totaling $300. The first and second-place winners in each division received handsome trophies. The 60 district winners each received, in addition to local awards, a $100 scholarship and a free trip to Chapel Hill to attend the state roadeo.

Goals Being Realized

In reviewing the experiences with the roadeo for the past three years, we feel that it is definitely contributing to the objectives we originally held —to add to the prestige of the school bus driver and to make the position of driving a school bus more attractive to the better qualified students in our public schools. In addition to realizing these objectives, we believe that the roadeo is making a substantial con-

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New Officers for Transporters

Newly elected officers of the Accident Prevention Conference of the National Automobile Transporters Association are: (l. to r.) secretary—H. K. Halbrooks, director, accident prevention division, NATA, Washington, D. C.; chairman of cooperative road patrol—Arthur L. Collins, safety director, E & L Transport Co., Dearborn, Mich.; chairman—M. R. Hunt, director of safety, United Transports, Inc., Oklahoma City, Okla., and vice-chairman—Norman J. Bleau, director of safety, Automobile Shippers, Inc., Detroit, Mich.

CV SECTION OFFICERS 1958-59

GENERAL CHAIRMAN

Karl Schulze, senior safety engineer, Standard Oil Co. of California, Western Operations, Inc., San Francisco, Calif.

VICE CHAIRMAN

L. F. Purves, superintendent of transportation and safety, Toronto Star, Ltd., Toronto, Ont.

SECRETARY

John A. De Pew, director of safety and personnel, Dohrn Transfer Co., Rock Island, Ill.

IMMEDIATE PAST GENERAL CHAIRMAN

F. S. Lake, director of safety, Interstate Motor Freight System, Inc., Grand Rapids, Mich.

STANDING COMMITTEE CHAIRMEN

Program

A. S. Lombardi, safety and personnel director, Western Truck Lines, Ltd., Los Angeles, Calif.

Contest

J. A. Waspi, director of safety and driver personnel, Allied Van Lines, Inc., Broadview, Ill.

Driver Award

J. W. Lumpkin, manager of safety, Railway Express Agency, Inc., New York, N. Y.

Membership

T. J. Biddle, administrator, motor vehicle safety, U. S. Post Office Department, Washington, D. C.

REGIONAL CHAIRMEN

Central

E. M. Barber, director, safety and insurance, Scherer Freight Lines, Ottawa, Ill.

Eastern

C. E. Ehrenberger, operating manager, Standard Brands, Inc., New York, N. Y.

Southern

W. L. Frigon, director of industrial relations, Hennis Freight Lines, Inc., Winston-Salem, N. C.

Western

H. B. Lowden, plant safety supervisor, Pacific Telephone & Telegraph, San Francisco, Calif.

MEMBERS-AT-LARGE

Central

J. J. Abfalder, safety director, eastern division, Consolidated Freightways, Inc., Indianapolis, Ind.

Karl Schulze

E. A. Hatfield, safety director, Coca-Cola Bottling Co., St. Louis, Mo.

R. L. Mosiman, asst. vice president, Riss & Co., Inc., Kansas City, Mo.

James R. Neely, safety director, The Greyhound Corp., Chicago, Ill.

G. K. Ross, director of safety and compliance, Frozen Food Express, Dallas, Tex.

Eastern

N. J. Bleau, safety director, Automobile Shippers, Inc., Detroit, Mich.

W. P. Bowling, Jr., safety director, Virginia Trailways, Charlottesville, Va.

W. A. Duffy, director of safety and personnel, The Davidson Transfer and Storage Co., Baltimore, Md.

J. W. Jacobson, director, accident control division, F. J. Boutell Driveaway Co., Inc., Flint, Mich.

G. L. Smith, assistant vice president, Motor Cargo, Inc., Akron, Ohio.

Southern

W. W. Carter, director, safety and personnel, Johnson Motor Lines, Inc., Charlotte, N. C.

H. R. Grant, Jr., safety director, Deaton Truck Lines, Birmingham, Ala.

J. E. Reid, director of safety, claims, personnel, and insurance, Central Motor Lines, Inc., Charlotte, N. C.

E. J. Stevens, transportation manager, Atlanta Newspapers, Inc., Atlanta, Ga.

H. T. Walton, director of safety, McLean Trucking Co., Winston-Salem, N. C.

Western

W. F. Bachmann, safety director, Omaha Public Power District, Omaha, Neb.

B. E. McEntee, general safety manager, Denver Chicago Trucking Co., Inc., Denver, Colo.

R. O. Olson, safety director, Dan Dugan Oil & Transport Co., Sioux Falls, S. D.

W. C. Taylor, director, personnel and safety, Ringsby Truck Lines, Inc., Denver, Colo.

Counselors

N. E. Aikin, director, industrial relations, Commercial Motor Freight, Inc., Columbus, Ohio.

K. N. Beadle, director of safety and driving, Pacific Intermountain Express, Oakland, Calif.

C. D. Calkins, manager, safety and personnel, Pacific Motor Trucking Co., San Francisco, Calif.

E. G. Cox, chief, section of motor carrier safety, Interstate Commerce Commission, Washington, D. C.

E. J. Emond, director, automotive safety, Armour and Co., Chicago, Ill.

W. T. Gowens, director, safety and personnel, Pilot Freight Carriers, Inc., Winston-Salem, N. C.

H. K. Halbrooks, director, accident prevention division, National Automobile Transporters Association, Washington, D. C.

A. L. Hauck, director, safety and public relations, Transportation Underwriters, Inc., Indianapolis, Ind.

H. R. Hosea, director of research, National Association of Motor Bus Operators, Washington, D. C.

W. G. Macintosh, manager, engineering department, Hartford Accident and Indemnity Co., New York, N. Y.

J. D. Mann, managing director, Private Truck Council of America, Inc., Washington, D. C.

A. E. Neyhart, administrative head—institute of public safety, The Pennsylvania State University, University Park, Pa.

R. N. Papich, safety consultant, American Gas Association, New York, N. Y.

F. J. Wirken, director, safety and personnel, Interstate Bakeries Corp., Kansas City, Mo.

TRANSIT OFFICERS FOR 1958-59

GENERAL CHAIRMAN

J. Godfrey Butler, director of personnel and labour relations, D. C. Transit System, Inc. (Washington, D. C.)

VICE CHAIRMAN

Paul J. Fanning, director, bureau of personnel and safety, San Francisco Public Utilities Commission.

SECRETARY

R. Dewey Cassell, general manager, Safety Motor Transit Co. (Roanoke, Va.)

PROGRAM CHAIRMAN

J. M. Busby, Jr., safety director, Memphis Transit System.

J. Godfrey Butler

MEMBERSHIP CHAIRMAN

Joe V. Garvey, general manager, Harrisburg Railway Co.

IMMEDIATE PAST GENERAL CHAIRMAN

D. L. Williamson, supervisor of accident prevention, Cleveland Transit System.

MEMBERS AT LARGE

Elmer R. Schuemann, superintendent of transportation and safety, United Motor Coach Co. (Des Plaines, Ill.)

Carl J. Andersen, personnel director, Milwaukee and Suburban Transport Corp.

Howard M. Baker, safety director, Montreal Transportation Commission.

Tyrell Estep, safety director, Indianapolis Transit System.

Bernard C. Hamel, supervisor of personnel, Safety & Welfare, Quebec Autobus, Ltd.

Charles E. Keiser, superintendent of transportation, Chicago Transit Authority.

Van Court Lucas, administrative assistant, American Transit Association.

Lee Mills, director of safety, Cincinnati Transit Co.

Paul W. Moyer, general superintendent Lehigh Valley Transit Co. (Allentown, Pa.)

J. W. Prutsman, safety director, Los Angeles Transit Authority.

Machlin E. Sternburgh, director of safety, New York City Transit Authority.

Patrick S. Sirois, safety director, Miami Transit Co.

E. J. Slingerland, safety director, Seattle Transit System.

B. Sudderth, safety director, Dallas Transit Co.

C. R. Sypher, manager, safety engineering department, Transit Casualty Co.

Ralph P. Talbott, safety supervisor, Phoenix Transit System.

Elliott A. Thiel, director, accident prevention, Columbus Transit Co. (Columbus, Ohio.)

J. L. Weeks, general supervisor of safety, South Carolina Electric and Gas Co. (Columbia, S. C.)

COUNSELLORS

M. G. Bullock, supervising engineer, Transit Casualty Co.

Colin Dobell, director, transportation safety and training, B. C. Electric Co. (Vancouver, B. C.)

Arthur J. Naquin, safety counsellor, New Orleans Public Service, Inc.

H. W. Whitcomb, superintendent, accident prevention, Philadelphia Transportation Co.

James S. Osborne, president and general manager, Cincinnati, Newport & Covington Transportation Co.

STAFF REPRESENTATIVE

Chris Imhoff, motor transportation division, National Safety Council.

NATIONAL FLEET SAFETY CONTESTANTS SCORE LOWEST ACCIDENT RATE IN CONTEST HISTORY

Contestants participating in the 1957-1958 National Fleet Safety Contest saved themselves 1½ million dollars, 300 personal injuries and 10 fatalities by operating more safely than during the previous contest year, it has been estimated by Council statisticians.

The more than 2,000 contending fleets operated in excess of 250,000 vehicles and traveled 5½ million miles during the contest period. Their combined average accident rate was 1.34 accidents per 100,000 vehicle miles, the lowest average rate thus far achieved in the 27-year history of the contest.

The rate was 11 per cent lower than that of the 1956-1957 contest and represented 3,000 fewer accidents despite the fact that mileage was almost 500 million higher than that of the previous year.

Trophies were awarded to winning fleets at ceremonies in the LaSalle Hotel during the 46th National Safety Congress and Exposition. Winners were also honored at a luncheon sponsored by General Motors Corp. at which more than 600 safety leaders from all segments of the motor transportation industry were present.

Winners in each division of the contest were declared only after personal audit by a representative appointed by the National Safety Council and after review of the audit by members of the National Fleet Safety Contest committee.

Administration of the audit was a complex undertaking requiring 334 audits in 136 cities in 41 states, the District of Columbia, Hawaii, and Canada. As a result of the audits, the records of 96 ranking fleets were adjusted up or down with respect to accidents or mileage. Six fleets withdrew following the audit and two were disqualified. This was the ninth year that the audit procedure has been a part of the contest.

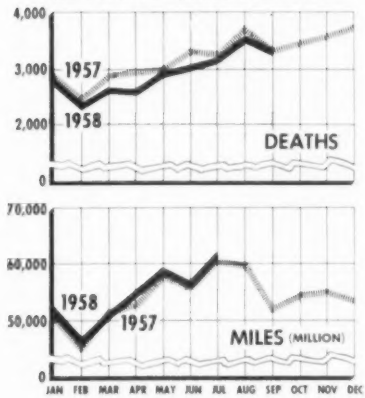
Winning fleets are listed in the 1958 "Accident Rates" pamphlet for motor transportation fleets.

From Page 4

The three leading cities in each population group at the end of nine months, ranked according to the number of deaths per 10,000 registered vehicles, were:

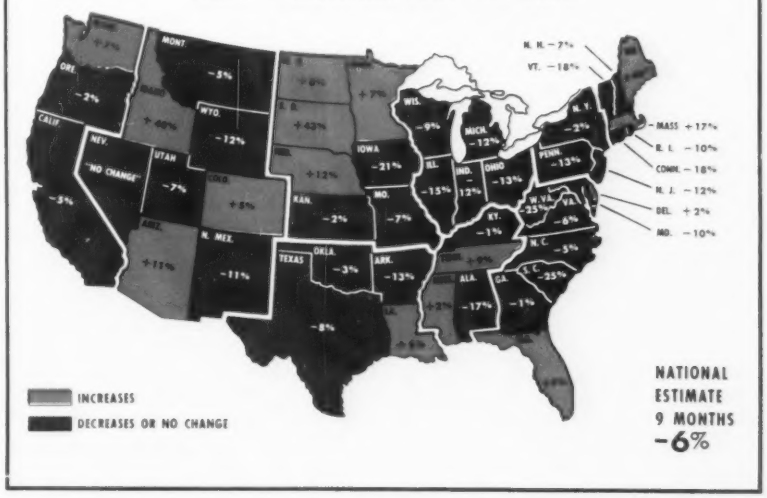
	Reg. Rate	Pop. Rate
Group I (Over 1,000,000)		
Detroit, Mich.	2.1	7.3
Chicago, Ill.	2.8	7.5
Los Angeles, Calif.	3.0	15.3
Group II (750,000 to 1,000,000)		
St. Louis, Mo.	1.8	6.4
San Francisco, Calif.	2.2	8.1
Washington, D. C.	2.3	6.3
Group III (500,000 to 750,000)		
Milwaukee, Wis.	1.3	4.7
Minneapolis, Minn.	2.0	7.9
Seattle, Wash.	2.4	11.2
Group IV (350,000 to 500,000)		
Indianapolis, Ind.	1.2	6.1
Portland, Ore.	1.7	8.4
Denver, Colo.	1.9	8.4
Group V (200,000 to 350,000)		
Wichita, Kan.	1.1	6.5
Toledo, Ohio	1.1	5.7
Syracuse, N. Y.	1.4	5.6
Group VI (100,000 to 200,000)		
Hartford, Conn.	0.5	1.4
Lincoln, Nebr.	0.5	2.2
Amarillo, Texas	0.5	2.7
Group VII (50,000 to 100,000)		
Orlando, Fla.	0.0	0.0
Santa Ana, Calif.	0.0	0.0
Evanston, Ill.	0.0	0.0
Group VIII (25,000 to 50,000)		
Whittier, Calif.	0.0	0.0
Boise, Idaho	0.0	0.0
Birmingham, Mich.	0.0	0.0
Group IX (10,000 to 25,000)		
Medford, Ore.	0.0	0.0
Victoria, Texas	0.0	0.0
South Euclid, Ohio	0.0	0.0

MONTHLY MOTOR VEHICLE DEATHS AND TRAFFIC TRENDS 1957-1958



● **STATE and city death records listed on these pages are reported to the Council by state and city agencies participating in the Council's accident reporting project. Reporting deadline for cities is the 23rd of the following month —for states, the 25th.**

CHANGES IN MOTOR-VEHICLE DEATHS
FIRST 9 MONTHS, 1957 TO 1958



MOTOR VEHICLE DEATHS AND DEATH RATES
1956, 1957 and 1958

Month	1956	1957	1958	1956-58 Change	1957-58 Change
January	2,954	2,880	2,760	— 7%	— 4%
February	2,652	2,480	2,330	—12%	— 6%
March	2,940	2,890	2,630	—11%	— 9%
April	2,970	2,950	2,600	—12%	—12%
May	3,094	3,000	2,910	— 6%	— 3%
June	3,338	3,310	3,010	—10%	— 9%
July	3,555	3,240	3,140	—12%	— 3%
August	3,535	3,690	3,500	—19%	— 5%
September	3,653	3,330	3,300	—10%	— 1%
Nine Months	28,691	27,770	26,180	— 9%	— 6%
October	3,476	3,450			
November	3,603	3,570			
December	3,858	3,710			
Total	39,628	38,500			

All 1956 figures are from the National Office of Vital Statistics.

All other figures are National Safety Council estimates. The 1958 national estimate is arrived at by assuming that the percentage change from 1957 to 1958 in the states reporting for both years reflects the 1957-1958 change in the entire country. First reports are preliminary, so revisions are made from time to time as later reports are received for the various months. Thus, figures above for 1958 may differ slightly from figures for the same months which will be published in future issues of TRAFFIC SAFETY.

TRAFFIC DEATHS—CITY RECORDS

The table covers only motor-vehicle deaths resulting from traffic accidents that occurred in the city. Nontraffic motor-vehicle deaths (where the accident occurred on home or work premises) are not included, nor are deaths in the city from accidents occurring outside.

Rankings are based on the 1958 registration death rate which is the number of deaths per 10,000 registered motor vehicles on an annual basis. Vehicle registration figures are for the year 1957 and were supplied by R. L. Polk & Company.

Cities are ranked by death rates—from low to high. When two or more cities have exactly the same rate, ranking is by total vehicle registrations—from large to small.

Cities shown in heavy type have improved in 1958 compared with 1957.

The population death rate is the number of deaths per 100,000 population on an annual basis. Populations are as of April, 1950, or later censuses taken by the U. S. Bureau of the Census.

	Nine Months 1958	1957	1956	1958 Reg. Rate	1958 Pop. Rate
ALL REPORTING CITIES				2.1	8.1
Group I (1,000,000 and over)					
1. Detroit, Mich.	106	126	151	2.1	7.5
2. Chicago, Ill.	212	221	241	2.8	7.5
3. Los Angeles, Calif.	257	294	291	3.0	15.3
4. Philadelphia, Pa.	115	115	130	3.1	7.5
All cities in this group				3.2	8.5
5. Baltimore, Md.	83	77	88	3.6	10.7
6. New York, N. Y.	451	422	396*	4.2	7.4
Group II (750,000 to 1,000,000)					
1. St. Louis, Mo.	41	55	74	1.8	6.4
2. San Francisco, Calif.	47	63	64	2.2	8.1
3. Washington, D. C.	39	49	40	2.3	6.3
All cities in this group				2.3	7.4
4. Cleveland, Ohio	64	82	71	2.8	8.8
Group III (500,000 to 750,000)					
1. Milwaukee, Wis.	25	27	50	1.3	4.7
2. Minneapolis, Minn.	31	30	24	2.0	7.9
3. Seattle, Wash.	48	33	46	2.4	11.2
4. Cincinnati, Ohio	36	48	37	2.4	8.8
5. Dallas, Tex.	51	48	33	2.5	11.7
6. Boston, Mass.	33	35	49	2.5	6.1
All cities in this group				2.7	9.4
7. Buffalo, N. Y.	40	37	35	2.8	8.9
8. Pittsburgh, Pa.	48	39	41	3.2	9.4
9. New Orleans, La.	50	54	51	3.8	11.1
10. San Diego, Calif.	65	42	44	5.0	17.3
Group IV (350,000 to 500,000)					
1. Indianapolis, Ind.	21	27	31	1.2	6.1
2. Portland, Ore.	26	30	30	1.7	8.4
3. Denver, Colo.	30	26	26	1.9	8.4
4. Memphis, Tenn.	22	20	31	2.1	6.0
5. Kansas City, Mo.	27	25	50	2.3	7.9
All cities in this group				2.3	9.1
6. Oakland, Calif.	31	33	39	2.8	10.7
7. Louisville, Ky.	35	24	47	2.9	11.9
8. Birmingham, Ala.	27	28	33	3.0	10.0
9. Atlanta, Ga.	50	58	44	3.7	13.5
Group V (200,000 to 350,000)					
1. Wichita, Kan.	11	12	10	1.1	6.5
2. Toledo, Ohio	13	23	16	1.1	5.7
3. Syracuse, N. Y.	9	6	11	1.4	5.6
4. Flint, Mich.	11	12	16	1.4	6.8
5. Dayton, Ohio	16	20	19	1.5	8.2
6. Grand Rapids, Mich.	14	14	19	1.6	6.8
7. Oklahoma City, Okla.	19	16	12	1.7	8.9
8. Providence, R. I.	12	14	10	1.8	6.4
9. Fort Worth, Tex.	22	22	37	1.8	8.9
10. Worcester, Mass.	8	9	11	1.8	5.3
11. Miami, Fla.	32	27	22	1.9	16.5
12. Omaha, Neb.	17	18	21	2.0	8.1
13. St. Paul, Minn.	23	21	19	2.2	9.8
All cities in this group				2.1	9.7
14. Richmond, Va.	18	17	26	2.2	10.1
15. Norfolk, Va.	15	7	10	2.2	6.7
16. Tampa, Fla.	20	15	29	2.2	9.9
17. Long Beach, Calif.	24	40	26	2.4	9.5
18. Akron, Ohio	33	42	27	3.5	14.4
19. Jacksonville, Fla.	31	14	13	5.0	16.5
20. El Paso, Tex.	36	19	29	6.7	19.2
Group VI (100,000 to 200,000)					
1. Hartford, Conn.	2	3	6	0.5	1.4
2. Lincoln, Neb.	2	3	9	0.5	2.2
3. Amarillo, Tex.	2	6	10	0.5	2.7
4. Rockford, Ill.	3	10	3	0.6	5.3
5. Arlington, Va.	3	6	7	0.7	2.6
6. Bridgeport, Conn.	3	10	9	0.7	2.3
7. Montgomery, Ala.	3	1	5	0.7	3.4
8. Saginaw, Mich.	3	11	8	0.8	3.7
9. Yonkers, N. Y.	3	4	8	0.8	2.2
10. Kansas City, Kan.	4	8	4	0.8	4.1
11. Savannah, Ga.	3	9	10	0.8	3.1
12. Fort Wayne, Ind.	5	9	10	0.8	4.6
13. Fresno, Calif.	7	13	5	1.0	7.6
14. Austin, Tex.	5	7	11	1.0	4.1
15. Glendale, Calif.	4	9	9	1.0	4.7
16. New Haven, Conn.	4	8	8	1.0	3.2
17. Erie, Pa.	5	9	6	1.0	4.9
18. Evansville, Ind.	5	9	6	1.1	4.0
19. Knoxville, Tenn.	5	7	7	1.1	5.3
20. Allentown, Pa.	4	5	3	1.1	4.8
21. Berkeley, Calif.	4	3	8	1.1	4.5
22. Utica, N. Y.	3	4	0	1.2	3.8
23. Peoria, Ill.	5	6	3	1.2	5.9
24. Waco, Tex.	4	7	10	1.2	5.3
25. Waterbury, Conn.	3	2	4	1.2	3.5
26. Jackson, Miss.	5	4	6	1.2	5.7
27. Canton, Ohio	6	9	11	1.3	6.3
28. South Bend, Ind.	6	6	8	1.3	6.1
29. Shreveport, La.	7	11	14	1.3	6.0
30. Madison, Wis.	5	4	1	1.3	6.0
31. Sacramento, Calif.	10	9	18	1.4	8.5
32. Lansing, Mich.	6	6	3	1.4	7.1
33. Trenton, N. J.	6	7	6	1.5	6.3
34. Spokane, Wash.	10	12	17	1.6	7.1
All cities in this group				1.6	7.3
35. Youngstown, Ohio	10	11	15	1.7	7.5
36. Wilmington, Del.	8	4	4	1.7	9.7
37. Salt Lake City, Utah	15	11	17	1.8	9.0
38. Tacoma, Wash.	10	12	10	1.8	8.5
39. Little Rock, Ark.	7	7	10	1.8	8.7
40. Niagara Falls, N. Y.	5	4	14	1.8	6.6
41. Pasadena, Calif.	9	16	12	1.9	10.5
42. Gary, Ind.	10	16	17	1.9	7.9
43. Lubbock, Tex.	7	1	4	1.9	8.9
44. Phoenix, Ariz.	23	11	20	1.9	19.2
45. San Jose, Calif.	14	14	22	2.1	14.6
46. Des Moines, Iowa	14	12	6	2.1	10.2
47. Reading, Pa.	7	10	1	2.1	8.2
48. Nashville, Tenn.	17	10	13	2.3	13.0
49. Corpus Christi, Tex.	12	11	14	2.3	11.0
50. Albuquerque, N. M.	14	13	5	2.5	11.0
51. Springfield, Mass.	12	6	14	2.6	9.6
52. Baton Rouge, La.	14	5	6	2.7	13.0
53. Elizabeth, N. J.	8	11	11	2.9	9.1
54. Mobile, Ala.	15	19	23	3.1	11.5
55. Chattanooga, Tenn.	16	13	18	3.7	16.3
56. Duluth, Minn.	14	10	7	4.3	17.7
57. Hammond, Ind.	16	16	9	5.8	19.7
Group VII (50,000 to 100,000)					
1. Orlando, Fla.	0	3	5	0.0	0.0
2. Santa Ana, Calif.	0	2	6	0.0	0.0
3. Evanston, Ill.	0	3	3	0.0	0.0
4. Bethlehem, Pa.	0	5	7	0.0	0.0
5. Elmira, N. Y.	0	1	2	0.0	0.0
6. Dubuque, Iowa	0	2	2	0.0	0.0
7. Bloomfield, N. J.	0	2	1	0.0	0.0
8. West Hartford, Conn.	0	1	3	0.0	0.0
9. Woonsocket, R. I.	0	4	2	0.0	0.0
10. Columbia, S. C.	1	8	4	0.3	1.4
11. Macon, Ga.	1	5	2	0.3	1.9
12. Royal Oak, Mich.	1	5	5	0.3	1.9
13. Jackson, Mich.	1	4	5	0.4	2.2
14. Mt. Vernon, N. Y.	1	1	2	0.5	1.8
15. Bay City, Mich.	1	3	3	0.5	2.2
16. Sioux Falls, S. D.	1	4	3	0.5	2.2
17. Pawtucket, R. I.	1	1	3	0.5	1.5
18. Pensacola, Fla.	2	1	4	0.5	5.2
19. New Rochelle, N. Y.	1	1	4	0.6	1.8
20. Oak Park, Ill.	1	2	8	0.6	2.2
21. Parma, Ohio	1	3	3	0.6	2.1
22. Pueblo, Colo.	2	5	1	0.6	3.2
23. Alameda, Calif.	1	1	1	0.7	1.8
24. Medford, Mass.	1	4	6	0.7	2.0
25. Battle Creek, Mich.	2	5	0	0.7	4.9
26. Lwr. Merion Twp., Pa.	1	3	3	0.7	2.3
27. Lancaster, Pa.	2	4	4	0.7	3.9
28. Muskegon, Mich.	2	4	2	0.7	4.7
29. Binghamton, N. Y.	2	6	2	0.7	3.3
30. Racine, Wis.	2	1	3	0.8	3.3
31. Muncie, Ind.	2	3	7	0.8	4.1
32. Johnstown, Pa.	2	4	1	0.8	4.2
33. Meriden, Conn.	1	4	5	0.8	2.3
34. Tucson, Ariz.	5	11	10	0.8	9.5
35. Davenport, Iowa	2	5	3	0.8	3.3
36. Fort Lauderdale, Fla.	4	4	6	0.8	8.5
37. Abilene, Tex.	2	2	2	0.8	4.4
38. Anderson, Ind.	2	3	3	0.8	5.3
39. Warren, Ohio	2	5	5	0.8	4.7
40. Alexandria, Va.	3	4	4	0.9	4.7
41. Colorado Spgs., Colo.	3	3	3	0.9	6.4
42. St. Joseph, Mo.	2	2	4	0.9	3.4
43. Aurora, Ill.	2	5	0	0.9	4.6
44. Asheville, N. C.	2	7	1	1.0	5.0
45. Lexington, Ky.	3	2	2	1.0	6.0
46. Kenosha, Wis.	2	1	1	1.0	4.1
47. Ann Arbor, Mich.	2	0	2	1.0	4.9
48. Greenville, S. C.	3	5	5	1.0	6.2
49. Springfield, Ohio	3	3	3	1.0	4.7
50. Springfield, Mo.	3	9	2	1.0	5.0
51. Kalamazoo, Mich.	4	4	7	1.1	7.1
52. Cedar Rapids, Iowa	3	4	3	1.1	5.1
53. St. Clair Shores, Mich.	2	0	5	1.1	4.3
54. Springfield, Ill.	4	2	2	1.1	6.5
55. Covington, Ky.	2	5	5	1.1	4.1
56. Schenectady, N. Y.	4	4	1	1.1	5.8
57. Waukegan, Ill.	2	2	4	1.1	5.3
58. Charleston, W. Va.	4	1	2	1.2	7.3
59. Reno, Nev.	3	2	1	1.3	7.6
60. Stamford, Conn.	3	3	3	1.3	4.5
61. Raleigh, N. C.	5	3	4	1.4	9.4
62. Portsmouth, Va.	3	4	4	1.4	4.4
63. San Mateo, Calif.	3	3	7	1.4	6.1
64. Tuscaloosa, Ala.	2	1	4	1.4	4.7
65. Manchester, N. H.	3	2	6	1.4	4.6
66. W. Palm Beach, Fla.	4	3	9	1.4	10.5
67. Wichita Falls, Tex.	4	3	5	1.5	5.9
68. Hamilton, Ohio	4	3	4	1.5	7.6
69. Huntington, W. Va.	4	5	9	1.5	6.2
70. Terre Haute, Ind.	4	2	7	1.5	7.3
71. Passaic, N. J.	2	3	3	1.5	4.6
72. Winston-Salem, N. C.	6	9	4	1.5	8.8
All cities in this group				1.5	7.3
73. Waltham, Mass.	2	2	4	1.6	5.3
74. Beaumont, Tex.	6	9	3	1.7	8.5
75. Riverside, Calif.	5	9	11	1.7	8.8
76. Green Bay, Wis.	4	4	6	1.7	9.7
77. Augusta, Ga.	4	3	6	1.7	7.2
78. Berwyn, Ill.	3	1	1	1.8	7.6
79. Newton, Mass.	5	7	3	1.8	7.7
80. Pomona, Calif.	4	5	2	1.9	8.6
81. Roanoke, Va.	6	8	3	1.9	8.4
82. Council Bluffs, Iowa	3	1	4	1.9	7.5
83. Wilkes-Barre, Pa.	4	3	2	1.9	6.9
84. Burbank, Calif.	7	3	3	1.9	10.3
85. Lorain, Ohio	4	4	4	1.9	8.6
86. Richmond, Calif.	4	3	10	2.0	5.4
87. San Leandro, Calif.	4	4	1	2.0	8.3
88. Durham, N. C.	5	5	3	2.0	9.4
89. Topeka, Kan.	8	5	5	2.1	12.9
90. Sioux City, Iowa	5	6	10	2.1	7.5
91. Pittsfield, Mass.	3	2	2	2.1	7.5
92. Lake Charles, La.	5	2	2	2.1	11.9
93. Joliet, Ill.	6	5	7	2.1	13.2
94. Stockton, Calif.	10	11	6	2.2	17.5
95. Columbus, Ga.	6	3	2	2.2	8.9
96. Waterloo, Iowa	5	4	4	2.2	9.5
97. Hayward, Calif.	6	3	6	2.2	14.6
98. Lincoln Park, Mich.	3	7	5	2.3	7.4
99. East Chicago, Ind.	3	5	4	2.3	7.0
100. Santa Barbara, Calif.	6	2	1	2.4	14.4
101. Ogden, Utah	6	4	2	2.4	12.3
102. Portland, Maine	5	6	11	2.4	8.5
103. Miami Beach, Fla.	6	6	2	2.5	15.7
104. New Britain, Conn.	5	2	1	2.5	7.6
105. Gadsden, Ala.	3	4	3	2.6	6.2
106. Lakewood, Ohio	5	2	4	2.6	9.5
107. Charleston, S. C.	4	2	4	2.7	7.6
108. West Allis, Wis.	4	3	2	2.7	8.5
109. Santa Monica, Calif.	7	8	5	3.1	12.2
110. Decatur, Ill.	10	6	4	3.2	16.9
111. Pontiac, Mich.	13	2	5	3.2	20.7
112. Euclid, Ohio	5	3	5	3.3	11.7

	Nine Months 1958	1957	1956	1958 Reg. Rate	1958 Pop. Rate
113. Wheeling, W. Va.	6	7	4	3.4	13.6
114. San Bernardino, Calif.	14	12	8	3.6	22.5
115. Brockton, Mass.	6	5	0	3.6	12.8
116. Brookline, Mass.	5	2	2	3.8	11.7
117. Compton, Calif.	10	7	4	3.8	20.9
118. Greensboro, N. C.	16	9	4	4.5	26.2
119. Norwalk, Conn.	5	9	6	4.7	10.6
120. Fort Smith, Ark.	8	10	4	4.8	17.8
121. Lynchburg, Va.	9	4	3	6.2	22.6
122. Atlantic City, N. J.	7	4	10	7.5	15.1
123. Hampton, Va.	14	7	10	7.6	24.5
124. Warren, Mich.	5	5	2	15.0	10.5

Group VIII (25,000 to 50,000)

1. Whittier, Calif.	0	2	0	0.0	0.0
2. Boise, Idaho	0	1	3	0.0	0.0
3. Birmingham, Mich.	0	3	0	0.0	0.0
4. Palo Alto, Calif.	0	3	4	0.0	0.0
5. Kettering, Ohio	0	4	2	0.0	0.0
6. Casper, Wyo.	0	0	2	0.0	0.0
7. Easton, Pa.	0	2	3	0.0	0.0
8. Elyria, Ohio	0	2	1	0.0	0.0
9. East Detroit, Mich.	0	3	3	0.0	0.0
10. Appleton, Wis.	0	1	2	0.0	0.0
11. Fullerton, Calif.	0	4	9	0.0	0.0
12. Sheboygan, Wis.	0	2	2	0.0	0.0
13. Bloomington, Ind.	0	0	0	0.0	0.0
14. Arlington, Mass.	0	0	0	0.0	0.0
15. Mishawaka, Ind.	0	4	1	0.0	0.0
16. Rome, N. Y.	0	0	0	0.0	0.0
17. Monroe, Mich.	0	2	1	0.0	0.0
18. Monrovia, Calif.	0	2	3	0.0	0.0
19. Norwich, Conn.	0	1	4	0.0	0.0
20. Manhattan Bch., Calif.	0	1	4	0.0	0.0
21. New Kensington, Pa.	0	0	1	0.0	0.0
22. St. Louis Pk., Minn.	0	1	1	0.0	0.0
23. Torrington, Conn.	0	1	0	0.0	0.0
24. Oak Park, Mich.	0	2	2	0.0	0.0
25. Burlington, Vt.	0	0	0	0.0	0.0
26. Minot, N. D.	0	2	1	0.0	0.0
27. Webster Groves, Mo.	0	2	0	0.0	0.0
28. Grand Forks, N. D.	0	1	2	0.0	0.0
29. Denton, Tex.	0	0	3	0.0	0.0
30. Urbana, Ill.	0	0	1	0.0	0.0
31. Belmont, Mass.	0	1	1	0.0	0.0
32. Park Forest, Ill.	0	1	1	0.0	0.0
33. Odessa, Tex.	1	4	1	0.4	3.0
34. Tyler, Tex.	1	4	3	0.5	2.9
35. Wyandotte, Mich.	1	4	2	0.5	2.7
36. White Plains, N. Y.	1	2	4	0.5	2.7
37. Elkhart, Ind.	1	3	0	0.5	3.4
38. Lafayette, Ind.	1	1	0	0.6	3.5
39. Everett, Wash.	1	3	1	0.6	3.8
40. Cheyenne, Wyo.	1	2	0	0.6	3.2
41. Hutchinson, Kan.	1	1	2	0.6	3.6
42. Beverly Hills, Calif.	1	2	3	0.6	4.4
43. Vallejo, Calif.	1	1	3	0.6	5.0
44. Owensboro, Ky.	1	2	4	0.7	3.4
45. Zanesville, Ohio	1	1	3	0.7	3.2
46. Hagerstown, Md.	1	2	1	0.7	3.5
47. Salina, Kan.	1	3	1	0.7	4.1
48. Richmond, Ind.	1	0	1	0.7	3.4
49. Las Vegas, Nev.	2	1	0	0.7	6.0
50. Aurora, Colo.	1	1	0	0.7	5.5
51. Enid, Okla.	1	0	1	0.7	3.6
52. Oshkosh, Wis.	1	2	1	0.7	3.0
53. Burlington, N. C.	1	2	0	0.7	5.3
54. East Cleveland, Ohio	1	2	1	0.8	3.3
55. Chicopee, Mass.	1	2	2	0.8	2.7
56. Ferndale, Mich.	1	1	2	0.8	3.9
57. Wausau, Wis.	1	0	1	0.8	4.2
58. Granite City, Ill.	1	1	4	0.8	3.6
59. Maywood, Ill.	1	1	2	0.8	4.8
60. Greenwich, Conn.	1	8	4	0.8	2.8
61. Bloomington, Ill.	1	4	0	0.9	3.7
62. Jackson, Tenn.	1	0	0	0.9	3.9
63. Westfield, N. J.	1	1	1	0.9	5.1
64. Billings, Mont.	2	0	0	0.9	6.9
65. Redwood City, Calif.	2	6	10	0.9	6.8
66. Fitchburg, Mass.	1	1	2	0.9	5.1
67. Watertown, N. Y.	1	1	3	1.0	3.8
68. Kearny, N. J.	1	1	3	1.0	5.3
69. Petersburg, Va.	1	2	4	1.0	3.6
70. Spartanburg, S. C.	2	0	2	1.1	6.4
71. Florence, S. C.	1	3	0	1.1	4.7
72. Greenville, Miss.	1	0	1	1.1	3.9
73. Milford, Conn.	1	3	1	1.1	3.5
74. Rahway, N. J.	1	1	2	1.1	4.9
75. Freeport, Ill.	1	1	2	1.1	5.2
76. Richfield, Minn.	1	0	0	1.1	5.8
77. Poughkeepsie, N. Y.	2	2	1	1.1	6.5
78. Superior, Wis.	1	5	3	1.2	3.8
79. Bristol, Conn.	1	1	3	1.2	5.0
80. Richland, Wash.	1	0	1	1.2	5.1
81. Yakima, Wash.	1	1	2	1.2	9.1
82. Wilmington, N. C.	2	4	5	1.3	5.8
83. Winona, Minn.	1	0	6	1.3	5.3
84. Plainfield, N. J.	2	1	1	1.3	5.7
85. Mt. Clemens, Mich.	2	2	0	1.3	10.4
86. Rock Island, Ill.	2	0	7	1.3	5.4
87. La Crosse, Wis.	2	1	4	1.4	5.6
88. Culver City, Calif.	2	1	2	1.4	8.5
89. Wauwatosa, Wis.	2	4	2	1.4	5.8
90. Rome, Ga.	2	1	3	1.4	8.3
91. University City, Mo.	2	3	0	1.4	5.6
92. Mt. Lebanon, Pa.	1	1	0	1.4	3.9
93. Cuyahoga Falls, Ohio	2	0	4	1.4	6.1
94. Bellingham, Wash.	2	1	4	1.4	7.3
95. Newburgh, N. Y.	2	1	1	1.5	7.9
96. Rapid City, S. D.	2	4	3	1.5	6.7
97. Benton Harbor, Mich.	2	0	1	1.5	10.5
98. Champaign, Ill.	2	3	4	1.5	5.5
99. Midland, Tex.	3	3	2	1.5	11.0
100. Rochester, Minn.	2	2	0	1.5	8.6
101. Hamtramck, Mich.	2	2	3	1.5	5.8
102. Fargo, N. D.	2	0	0	1.5	6.5
103. Annapolis, Md.	1	0	1	1.5	5.3
104. Oxnard, Calif.	2	1	8	1.5	7.8
105. Beloit, Wis.	2	4	0	1.5	8.4
All cities in this group				1.5	7.2
106. Eau Claire, Wis.	2	0	1	1.6	7.4
107. Portsmouth, Ohio	2	2	8	1.6	7.3
108. Elmhurst, Ill.	2	0	0	1.6	7.7
109. Gainesville, Fla.	2	1	1	1.6	8.6
110. Stratford, Conn.	2	6	0	1.7	6.4
111. Galesburg, Ill.	2	0	1	1.7	7.9
112. Danbury, Conn.	2	3	3	1.7	7.0
113. Steubenville, Ohio	2	2	1	1.7	7.4
114. Ontario, Calif.	3	4	0	1.7	9.6
115. Kokomo, Ind.	3	0	1	1.7	9.1
116. Janesville, Wis.	2	1	0	1.8	8.4
117. Manchester, Conn.	2	8	9	1.8	6.1
118. Hamden, Conn.	2	1	3	1.8	7.5
119. Findlay, Ohio	2	1	2	1.8	9.7
120. Kingston, N. Y.	2	0	0	1.8	8.8
121. West Haven, Conn.	2	0	5	1.8	6.9
122. Burlington, Iowa	2	4	2	1.9	8.7
123. Chicago Heights, Ill.	2	0	1	1.9	9.2
124. Fond du Lac, Wis.	2	0	1	1.9	8.0
125. Walla Walla, Wash.	2	0	1	1.9	10.5
126. Mason City, Iowa	2	0	1	1.9	9.1
127. Lockport, N. Y.	2	2	2	2.0	10.2
128. Fair Lawn, N. J.	2	0	0	2.0	9.7
129. St. Cloud, Minn.	2	1	2	2.0	8.3
130. Rock Hill, S. C.	2	1	1	2.0	8.0
131. Vancouver, Wash.	4	7	3	2.0	12.7
132. Quincy, Ill.	3	5	4	2.0	9.4
133. High Point, N. C.	4	2	2	2.0	12.1
134. Hazel Park, Mich.	2	0	2	2.0	10.0
135. Hackensack, N. J.	2	1	2	2.1	8.3
136. National City, Calif.	2	0	0	2.1	8.4
137. Highland Pk., Mich.	3	5	4	2.1	8.6
138. Provo, Utah	2	3	4	2.1	8.1
139. Bangor, Maine	2	1	2	2.1	6.7
140. Ventura, Calif.	3	1	2	2.1	15.4
141. Modesto, Calif.	6	7	5	2.1	23.7
142. Redlands, Calif.	2	3	2	2.2	10.4
143. Livonia, Mich.	3	7	5	2.2	8.2
144. Tallahassee, Fla.	4	1	0	2.2	14.0
145. Sumter, S. C.	2	0	0	2.3	10.6
146. Clearwater, Fla.	4	7	5	2.3	18.3
147. Temple, Tex.	2	6	5	2.3	8.9
148. Great Falls, Mont.	4	0	2	2.4	11.4
149. Daytona Beach, Fla.	3	2	3	2.4	11.0
150. Elgin, Ill.	4	3	4	2.4	11.1
151. Oak Ridge, Tenn.	2	1	2	2.5	9.3
152. Newark, Ohio	4	5	2	2.6	13.8
153. Baldwin Park, Calif.	3	1	0	2.9	12.4
154. Manitowoc, Wis.	3	2	0	2.9	13.3
155. Arcadia, Calif.	5	3	8	2.9	17.9
156. Maron, Ohio	4	2	0	3.0	15.1
157. East Lansing, Mich.	2	0	0	3.1	10.6
158. Alton, Ill.	4	8	2	3.2	16.3
159. East Hartford, Conn.	4	4	2	3.2	13.8
160. Sandusky, Ohio	4	4	1	3.3	16.2
161. Pasadena, Tex.	5	0	0	3.4	14.0
162. Michigan City, Ind.	4	4	1	3.4	16.8
163. Vineland, N. J.	4	2	9	3.5	16.2
164. Coral Gables, Fla.	5	2	6	3.7	22.8
165. Mountain View, Calif.	4	5	1	3.7	20.5
166. Danville, Va.	5	5	4	3.7	13.8
167. West Orange, N. J.	4	1	1	3.7	15.5
168. Concord, N. H.	5	0	1	3.8	13.4
169. Revere, Mass.	3	6	3	3.9	10.1
170. West Covina, Calif.	4	4	3	4.0	11.8
171. Moline, Ill.	6	3	4	4.2	20.4
172. Fairfield, Conn.	4	2	3	4.2	17.5
173. Warwick, R. I.	6	5	6	4.4	18.6
174. New London, Conn.	4	0	3	4.4	15.2
175. Linden, N. J.	5	2	2	4.4	18.2
176. Newport News, Va.	5	4	0	4.5	13.6
177. Middletown, Conn.	4	3	4	5.1	14.8
178. Teaneck, N. J.	5	1	1	5.3	17.5
179. Pocatello, Idaho	7	4	1	5.4	34.4
180. Shaker Heights, Ohio	5	0	0	5.5	19.3
181. Barberton, Ohio	7	3	1	5.8	26.8
182. Garfield Hgts., Ohio	6	3	3	6.8	23.0

Group IX (10,000 to 25,000)

1. Medford, Ore.	0	3	0	0.0	0.0
2. Victoria, Tex.	0	3	0	0.0	0.0
3. South Euclid, Ohio	0	1	1	0.0	0.0
4. Klamath Falls, Ore.	0	4	0	0.0	0.0
5. Boulder, Colo.	0	1	0	0.0	0.0
6. Fort Myers, Fla.	0	0	1	0.0	0.0
7. Greeley, Colo.	0	4	2	0.0	0.0
8. Greensboro, Pa.	0	1	1	0.0	0.0
9. Waukesha, Wis.	0	0	5	0.0	0.0
10. Yuma, Ariz.	0	2	0	0.0	0.0
11. Ponca City, Okla.	0	1	2	0.0	0.0
12. Bell, Calif.	0	1	2	0.0	0.0
13. Morristown, N. J.	0	1	0	0.0	0.0
14. Fremont, Ohio	0	0	4	0.0	0.0
15. Kenmore, N. Y.	0	1	0	0.0	0.0
16. La Grange, Ill.	0	0	0	0.0	0.0
17. Floral Park, N. Y.	0	0	0	0.0	0.0
18. Plainview, Tex.	0	0	0	0.0	0.0
19. Helena, Mont.	0	0	0	0.0	0.0
20. Meadville, Pa.	0	0	1	0.0	0.0
21. Traverse City, Mich.	0	2	2	0.0	0.0
22. Manhattan, Kan.	0	2	2	0.0	0.0
23. Tiffin, Ohio	0	1	0	0.0	0.0
24. Frederick, Md.	0	0	0	0.0	0.0
25. Edina, Minn.	0	2	1	0.0	0.0
26. Sedalia, Mo.	0	0	0	0.0	0.0
27. Hibbing, Minn.	0	0	0	0.0	0.0
28. Peru, Ind.	0	0	1	0.0	0.0
29. East Haven, Conn.	0	1	0	0.0	0.0
30. Hanford, Calif.	0	0	0	0.0	0.0
31. North Platte, Neb.	0	0	0	0.0	0.0
32. Griffin, Ga.	0	0	0	0.0	0.0
33. Pittsburg, Kan.	0	0	0	0.0	0.0
34. Muscatine, Iowa	0	2	3	0.0	0.0
35. Frankfort, Ind.	0	0	0	0.0	0.0
36. Maple Heights, Ohio	0	1	3	0.0	0.0
37. Brownwood, Tex.	0	0	1	0.0	0.0
38. Reidsville, N. C.	0	2	0	0.0	0.0
39. Streator, Ill.	0	1	0	0.0	0.0
40. Woodland, Calif.	0	1	1	0.0	0.0
41. Wisconsin Rpds., Wis.	0	0	0	0.0	0.0
42. Martinsburg, W. Va.	0	3	0	0.0	0.0
43. Cranford, N. J.	0	1	0	0.0	0.0
44. Albert Lea, Minn.	0	3	0	0.0	0.0
45. Cape Girardeau, Mo.	0	0	1	0.0	0.0
46. Emporia, Kan.	0	0	0	0.0	0.0
47. Sterling, Ill.	0	0	0	0.0	0.0
48. Port Angeles, Wash.	0	1	0	0.0	0.0
49. Berkley, Mich.	0	3	0	0.0	0.0
50. Alpena, Mich.	0	2	2	0.0	0.0
51. Madison Hts., Mich.	0	0	1	0.0	0.0
52. Defiance, Ohio	0	0	1	0.0	0.0
53. Plymouth, Mich.	0	1	0	0.0	0.0
54. Pittsburg, Calif.	0	0	1	0.0	0.0
55. Collingswood, N. J.	0	0	1	0.0	0.0
56. El Dorado, Kan.	0	3	0	0.0	0.0
57. Arkansas City, Kan.	0	1	1	0.0	0.0
58. Suffolk, Va.	0	1	1	0.0	0.0
59. Cedar Falls, Iowa	0	1	1	0.0	0.0
60. Brainerd, Minn.	0	1	0	0.0	0.0
61. Niles, Ohio	0	1	2	0.0	0.0
62. North Miami, Fla.	0	1	2	0.0	0.0
63. Stevens Point, Wis.	0	0	2	0.0	0.0
64. Muskegon Hts., Mich.	0	2	1	0.0	0.0
65. Canton, Ill.	0	0	0	0.0	0.0
66. Brookfield, Ill.	0	1	0	0.0	0.0
67. Corona, Calif.	0	1	1	0.0	0.0
68. Owatonna, Minn.	0	0	0	0.0	0.0
69. Marquette, Mich.	0	0	0	0.0	0.0
70. The Dalles, Ore.	0	1	0	0.0	0.0
71. Norfolk, Neb.	0	0	0	0.0	0.0
72. Boone, Iowa	0	1	1	0.0	0.0
73. Rocky River, Ohio	0	0	0	0.0	0.0
74. Astoria, Ore.	0	1	2	0.0	0.0
75. North Adams, Mass.	0	0	1	0.0	0.0
76. East Moline, Ill.	0	0	0	0.0	0.0
77. Bristol, Va.	0	0	0	0.0	0.0
78. Fergus Falls, Minn.	0	0	0	0.0	0.0
79. So. Milwaukee, Wis.	0	3	1	0.0	0.0
80. Lamesa, Tex.	0	0	0	0.0	0.0
81. Tempe, Ariz.	0	2	1	0.0	0.0
82. Winfield, Kan.	0	0	0	0.0	0.0
83. Naugatuck, Conn.	0	2	0	0.0	0.0
84. Mamaroneck, N. Y.	0	0	2	0.0	0.0
85. St. Joseph, Mich.	0	0	0	0.0	0.0
86. Hawthorne, N. J.	0	3	0	0.0	0.0
87. Villa Park, Ill.	0	0	1	0.0	0.0
88. Winnetka, Ill.	0	1	0	0.0	0.0
89. Conneaut, Ohio	0	0	0	0.0	0.0
90. Garden City, Kan.	0	0	2	0.0	0.0
91. Livermore, Calif.	0	2	0	0.0	0.0
92. Hopewell, Va.	0	0	2	0.0	0.0
93. Escanaba, Mich.	0	1	3	0.0	0.0
94. Beaver Dam, Wis.	0	1	1	0.0	0.0
95. Rye, N. Y.	0	2	0	0.0	0.0
96. State College, Pa.	0	0	0	0.0	0.0
97. Mitchell, S. D.	0	0	0	0.0	0.0
98. Virginia, Minn.	0	0	1	0.0	0.0
99. Ansonia, Conn.	0	1	0	0.0	0.0
100. Van Wert, Ohio	0	0	0	0.0	0.0
101. Du Bois, Pa.	0	0	1	0.0	0.0
102. Darien, Conn.	0	0	1	0.0	0.0

	Nine Months 1958	1957	1956	1958 Reg. Rate	1958 Pop. Rate
103. River Rouge, Mich.	0	0	3	0.0	0.0
104. Mansfield, Conn.	**0**	**1**	**1**	**0.0**	**0.0**
105. Central Falls, R. I.	0	0	0	0.0	0.0
106. Hays, Kan.	0	0	0	0.0	0.0
107. Grosse Pt. Wds., Mich.	**0**	**1**	**0**	**0.0**	**0.0**
108. Bellafontaine, Ohio	**0**	**1**	**0**	**0.0**	**0.0**
109. University Hts., Ohio	0	0	1	0.0	0.0
110. Los Alamos, N. M.	**0**	**1**	**0**	**0.0**	**0.0**
111. Ecorse, Mich.	**0**	**2**	**0**	**0.0**	**0.0**
112. Hornell, N. Y.	0	0	0	0.0	0.0
113. Charles City, Iowa	**0**	**1**	**0**	**0.0**	**0.0**
114. River Forest, Ill.	**0**	**1**	**0**	**0.0**	**0.0**
115. Cadillac, Mich.	0	0	0	0.0	0.0
116. Grosse Pte. Pk., Mich.	**0**	**2**	**1**	**0.0**	**0.0**
117. Ironwood, Mich.	**0**	**1**	**1**	**0.0**	**0.0**
118. Two Rivers, Wis.	0	0	0	0.0	0.0
119. Pacific Grove, Calif.	0	0	0	0.0	0.0
120. La Salle, Ill.	0	0	0	0.0	0.0
121. Branford, Conn.	**0**	**1**	**5**	**0.0**	**0.0**
122. Moscow, Idaho	0	0	0	0.0	0.0
123. Fairfield, Ala.	0	0	0	0.0	0.0
124. Ridgefield Pk., N. J.	**0**	**1**	**0**	**0.0**	**0.0**
125. Webster, Mass.	0	0	0	0.0	0.0
126. Takoma Park, Md.	0	0	1	0.0	0.0
127. Killingly, Conn.	**0**	**3**	**2**	**0.0**	**0.0**
128. Donora, Pa.	0	0	1	0.0	0.0
129. Watertown, Conn.	**0**	**1**	**0**	**0.0**	**0.0**
130. Stonington, Conn.	**0**	**2**	**4**	**0.0**	**0.0**
131. Enfield, Conn.	**0**	**2**	**5**	**0.0**	**0.0**
132. Hollywood, Fla.	**1**	**3**	**0**	**0.6**	**5.8**
133. Covina, Colo.	1	1	1	0.7	7.9
134. Englewood, Calif.	1	0	0	0.7	5.8
135. Butler, Pa.	**1**	**2**	**0**	**0.8**	**5.5**
136. Ypsilanti, Mich.	**1**	**2**	**1**	**0.8**	**5.8**
137. Salisbury, N. C.	**1**	**5**	**1**	**0.9**	**6.3**
138. La Mesa, Calif.	1	1	2	0.9	5.7
139. Austin, Minn.	1	0	1	0.9	5.5
140. Mesa, Ariz.	1	1	0	1.0	6.1
141. Lodi, Calif.	1	0	2	1.0	6.6
142. Niles, Mich.	**1**	**3**	**1**	**1.0**	**7.3**
143. Uniontown, Pa.	1	0	1	1.0	6.3

	Nine Months 1958	1957	1956	1958 Reg. Rate	1958 Pop. Rate
144. Lawrence, Kan.	1	1	0	1.0	5.7
145. Kinston, N. C.	1	0	1	1.1	5.9
146. Sherman, Tex.	**1**	**2**	**0**	**1.1**	**6.0**
147. Endicott, N. Y.	1	0	1	1.1	6.8
148. Whitefish Bay, Wis.	1	0	0	1.2	7.2
149. Carlsbad, N. M.	**1**	**2**	**2**	**1.2**	**6.8**
150. Wooster, Ohio	1	1	1	1.2	8.3
151. Great Bend, Kan.	1	0	1	1.2	8.2
152. Bismarck, N. D.	1	0	0	1.2	6.0
153. Borger, Tex.	**1**	**2**	**1**	**1.2**	**7.3**
154. Ames, Iowa	1	0	1	1.2	5.7
155. Port Chester, N. Y.	1	0	2	1.2	5.4
All cities in this group				1.2	6.3
156. Owosso, Mich.	**1**	**2**	**1**	**1.3**	**6.7**
157. Goshen, Ind.	1	0	1	1.3	10.1
158. Jeffersonville, Ind.	1	0	0	1.3	7.0
159. Corvallis, Ore.	1	0	3	1.3	7.2
160. Valparaiso, Ind.	1	0	0	1.3	9.9
161. Caldwell, Idaho	1	0	0	1.3	11.4
162. Marietta, Ohio	1	1	0	1.4	8.1
163. Wheaton, Ill.	1	1	1	1.4	6.7
164. Highland Park, Ill.	1	0	1	1.4	5.7
165. So. St. Paul, Minn.	1	0	0	1.4	7.7
166. Mt. Vernon, Ill.	1	0	1	1.4	8.5
167. Napa, Calif.	**2**	**10**	**3**	**1.4**	**17.0**
168. Johnson City, N. Y.	1	1	0	1.5	6.9
169. Highland Park, Tex.	1	0	0	1.5	10.9
170. St. Augustine, Fla.	**1**	**2**	**0**	**1.5**	**9.1**
171. New Bern, N. C.	**1**	**2**	**1**	**1.6**	**7.1**
172. Oswego, N. Y.	**1**	**2**	**0**	**1.6**	**5.9**
173. Monroe, N. C.	1	1	1	1.6	12.7
174. Holland, Mich.	2	2	0	1.6	13.7
175. Elmwood Park, Ill.	1	0	1	1.7	5.8
176. McAlester, Okla.	1	1	0	1.7	7.4
177. Newton, Kan.	1	0	1	1.7	10.1
178. Antioch, Calif.	1	1	1	1.7	8.6
179. Mt. Pleasant, Mich.	1	0	1	1.8	11.0
180. Pasco, Wash.	1	1	0	1.8	9.6
181. Lake Worth, Fla.	**2**	**8**	**0**	**1.8**	**17.5**
182. Faribault, Minn.	1	0	1	1.8	8.3
183. Santa Paula, Calif.	1	0	1	1.8	10.9

	Nine Months 1958	1957	1956	1958 Reg. Rate	1958 Pop. Rate
184. Watertown, Wis.	**1**	**5**	**0**	**1.8**	**10.2**
185. Homewood, Ala.	2	1	0	1.8	14.8
186. South Orange, N. J.	1	0	0	1.9	8.2
187. El Cerrito, Calif.	1	1	2	1.9	5.6
188. Wethersfield, Conn.	**1**	**4**	**2**	**1.9**	**8.1**
189. Shorewood, Wis.	2	1	0	2.0	16.5
190. Atchison, Kan.	1	0	1	2.0	10.4
191. Albany, Calif.	**1**	**3**	**0**	**2.0**	**7.6**
192. Pampa, Tex.	2	2	1	2.0	14.0
193. Merced, Calif.	2	2	5	2.0	13.1
194. Gardner, Mass.	1	0	1	2.0	6.6
195. Prescott, Ariz.	1	1	1	2.1	12.5
196. Bowling Green, Ohio	1	1	0	2.2	9.5
197. Vernon, Conn.	1	1	2	2.2	13.2
198. Lufkin, Tex.	2	0	0	2.2	15.3
199. Albion, Mich.	1	0	2	2.2	9.5
200. Dyersburg, Tenn.	**1**	**2**	**0**	**2.2**	**12.2**
201. Ocala, Fla.	2	2	5	2.3	18.7
202. Red Wing, Minn.	1	0	0	2.5	11.8
203. Marinette, Wis.	1	1	1	2.4	9.4
204. Cambridge, Md.	1	0	0	2.4	12.8
205. Menominee, Mich.	1	0	0	2.5	11.5
206. Windsor, Conn.	1	1	3	2.5	8.9
207. Westport, Conn.	2	2	5	2.5	16.1
208. Cudahy, Wis.	**1**	**3**	**0**	**2.5**	**10.6**
209. Denison, Tex.	2	1	4	2.6	12.8
210. Ottawa, Ill.	2	2	1	2.6	13.7
211. Milford, Mass.	1	1	0	2.7	8.5
212. Bellaire, Ohio	1	0	0	2.7	10.6
213. Winchester, Conn.	1	1	0	2.7	12.7
214. West Lafayette, Ind.	1	0	0	2.7	10.2
215. Groton, Conn.	1	1	4	2.7	6.1
216. Fort Thomas, Ky.	**1**	**2**	**1**	**2.8**	**9.7**
217. Aberdeen, S. D.	2	2	1	2.8	12.1
218. Wilmette, Ill.	2	1	3	2.8	10.8
219. Xenia, Ohio	2	1	2	2.8	16.4
220. Texarkana, Ark.	2	2	0	2.9	13.6
221. Connersville, Ind.	2	0	0	2.9	15.1

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TRAFFIC DEATHS—STATE RECORDS

Deaths are reported by state traffic authorities.

All figures are preliminary. To insure proper comparisons, 1957 and 1956 figures cover the same reporting period as those for 1958.

Population Rate: U. S. population rate is the estimated annual number of deaths per 100,000 population, assuming that deaths for the rest of the year will follow the normal seasonal pattern. State population rate is the estimated annual number of deaths per 100,000 population, assuming that the monthly average of deaths will remain at the present average for the rest of the year. Population rates are based on July 1, 1957, population estimates, U. S. Bureau of the Census, Washington, D. C.

States shown in heavy type have improved in 1958 compared with 1957, or showed no change.

Mileage Rate: The number of deaths per 100 million vehicle miles of travel.

(Figures in parenthesis following the 1958 mileage rate indicate the number of months for which the mileage rate is calculated for each state.)

*Less than .5%.

	Months Reported	Deaths Identical Periods 1958	1957	1956	% Change 1957 to 1958	% Change 1956 to 1958	1958 Pop. Rate	1958 Mile. Rate	
TOTAL U.S.	9	26,180	27,770	28,691	— 6%	— 9%	20.9	5.1	(7)
Ala.	9	557	668	714	— 17%	— 22%	23.5	6.7	(7)
Ariz.	9	353	319	319	+ 11%	+ 11%	41.5	8.8	(8)
Ark.	9	306	351	335	— 13%	— 9%	23.1	5.8	(8)
Calif.	9	2,526	2,662	2,685	— 5%	— 6%	24.2	5.1	(7)
Colo.	9	285	271	303	+ 5%	— 6%	22.7	4.8	(6)
Conn.	9	165	201	220	— 18%	— 25%	9.8	2.2	(8)
Del.	9	67	66	69	+ 2%	— 3%	20.3	4.0	(7)
D. of C.	9	39	49	40	— 20%	— 3%	6.3	2.3	(7)
Fla.	9	817	766	892	+ 7%	— 8%	26.6	5.6	(8)
Ga.	9	664	673	808	— 1%	— 18%	23.4	5.8	(7)
Idaho	9	201	144	195	+ 40%	+ 3%	42.2	7.9	(7)
Ill.	9	1,279	1,504	1,511	— 15%	— 15%	17.7	4.8	(6)
Ind.	9	727	823	846	— 12%	— 14%	21.4	4.5	(8)
Iowa	9	406	511	513	— 21%	— 21%	19.3	4.4	(7)
Kan.	9	395	402	489	— 2%	— 19%	24.7	5.2	(7)
Ky.	9	559	565	539	— 1%	+ 4%	24.5	7.1	(7)
La.	9	584	560	618	+ 4%	— 6%	25.4	7.5	(8)
Maine	9	142	97	113	+ 46%	+ 26%	20.0	4.4	(8)
Md.	9	366	405	387	— 10%	— 5%	16.9	4.7	(7)
Mass.	9	409	351	395	+ 17%	+ 4%	11.2	3.5	(7)
Mich.	9	936	1,069	1,260	— 12%	— 26%	16.0	4.1	(8)
Minn.	9	514	480	443	+ 7%	+ 16%	20.6	4.7	(7)
Miss.	9	370	362	384	+ 2%	— 4%	22.6	6.5	(8)
Mo.	9	663	712	809	— 7%	— 18%	20.8	4.3	(6)
Mont.	9	144	152	200	— 5%	— 28%	28.8	4.8	(7)
Neb.	9	236	211	229	+ 12%	+ 3%	21.7	4.9	(8)
Nev.	9	102	102	93	0%	+ 10%	50.9	6.7	(6)

	Months Reported	Deaths Identical Periods 1958	1957	1956	% Change 1957 to 1958	% Change 1956 to 1958	1958 Pop. Rate	1958 Mile. Rate	
N. H.	9	68	73	76	— 7%	— 11%	15.9	3.4	(7)
N. J.	9	533	603	547	— 12%	— 3%	12.6	3.2	(7)
N. M.	9	284	318	284	— 11%	0%	45.7	7.6	(7)
N. Y.	9	1,488	1,512	1,499	— 2%	— 1%	12.5	4.4	(7)
N. C.	9	737	779	797	— 5%	— 8%	21.8	5.6	(7)
N. D.	9	109	101	127	+ 8%	— 14%	22.5	5.0	(7)
Ohio	9	1,265	1,456	1,400	— 13%	— 10%	18.3	4.5	(8)
Okla.	9	490	507	489	— 3%	+ 0%	28.7	6.3	(5)
Ore.	9	310	315	302	— 2%	+ 3%	23.3	5.3	(8)
Pa.	9	1,052	1,214	1,285	— 13%	— 18%	12.7	3.6	(7)
R. I.	9	55	61	47	— 10%	+ 17%	8.8	2.3	(8)
S. C.	9	401	535	517	— 25%	— 22%	22.6	6.2	(7)
S. D.	9	185	129	133	+ 43%	+ 39%	35.2	9.3	(8)
Tenn.	9	523	482	544	+ 9%	— 4%	20.1	5.4	(8)
Tex.	9	1,645	1,795	1,872	— 8%	— 12%	24.0	4.8	(7)
Utah	9	144	155	161	— 7%	— 12%	22.6	4.7	(7)
Vt.	9	58	71	66	— 18%	— 12%	20.5	5.1	(7)
Va.	9	611	653	603	— 6%	+ 1%	21.4	5.1	(8)
Wash.	9	392	366	373	+ 7%	+ 5%	19.2	4.7	(7)
W. Va.	9	264	350	313	— 25%	— 16%	17.8	5.3	(7)
Wis.	9	600	658	708	— 9%	— 15%	20.7	5.1	(7)
Wyo.	9	105	119	130	— 12%	— 19%	44.3	6.6	(8)
CANADIAN PROVINCES									
Alta.	9	238	172	165	+ 38%	+ 44%	33.7	—	—
B. C.	8	163	147	179	+ 11%	— 9%	21.0	—	—
Man.	8	68	86	74	— 21%	— 8%	13.1	—	—
Sask.	9	104	86	70	+ 21%	+ 49%	16.7	—	—

	Nine Months 1958	1957	1956	1958 Reg. Rate	1958 Pop. Rate
222. Longview, Wash.	3	0	0	3.0	17.2
223. Leominster, Mass.	2	2	0	3.0	10.8
224. Santa Cruz, Calif.	4	1	1	3.0	23.4
225. Statesville, N. C.	3	3	1	3.1	22.7
226. Stillwater, Okla.	2	1	0	3.1	13.2
227. La Porte, Ind.	3	3	0	3.1	18.9
228. Moorhead, Minn.	2	0	0	3.1	15.0
229. Derby, Conn.	1	1	0	3.2	11.3
230. Massena, N. Y.	2	1	0	3.3	16.7
231. Orange, Calif.	**3**	**4**	**3**	**3.4**	**18.8**
232. Sweetwater, Tex.	2	1	1	3.6	19.6
233. Sault Ste. Marie, Mich.	2	1	1	3.8	13.6
234. Brawley, Calif.	2	1	2	4.0	19.9
235. Needham, Mass.	**2**	**3**	**1**	**4.0**	**12.4**
236. W. Springfield, Mass.	3	0	4	4.2	17.5
237. Millbrae, Calif.	2	1	0	4.5	18.4
238. Wallingford, Conn.	3	2	4	4.8	16.2
239. So. Portland, Maine	3	1	0	5.4	16.5
240. Attleboro, Mass.	3	0	0	5.5	16.1
241. Beacon, N. Y.	2	2	0	5.7	17.8
242. Southington, Conn.	**2**	**3**	**4**	**5.8**	**20.4**
243. Calumet City, Ill.	**4**	**5**	**2**	**6.0**	**23.7**
244. Newport Bch., Calif.	4	2	2	6.3	25.1
245. Logan, Utah	3	0	0	6.5	23.8
246. Amherst, Mass.	2	0	0	6.7	32.6
247. Bloomington, Minn.	6	1	2	6.8	63.5
248. North Chicago, Ill.	3	2	4	7.6	22.2
249. Windham, Conn.	4	2	4	7.9	35.5
250. Marshfield, Wis.	4	0	0	8.1	39.2
251. Shelton, Conn.	5	1	0	10.4	40.7
252. Middleborough, Mass.	6	1	3	15.0	72.1
CANADIAN CITIES					
Medicine Hat, Alta.	0	0	0	—	0.0
Red Deer, Alta.	0	0	0	—	0.0
Edmonton, Alta.	8	0	14	—	6.7
Vancouver, B. C.	19	22	28	—	7.3
Calgary, Alta.	8	6	8	—	8.3
Toronto, Ont.	88	85	46	—	8.5
Hamilton, Ont.	14	20	18	—	9.0
Montreal, Que.	77	109	90	—	10.0
Lethbridge, Alta.	2	4	0	—	11.7

Tire Killings

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features, that meet all the safety requirements above. Enlist help from local and state safety councils, motor clubs and other safety minded groups.

Remember this menace when you read your daily newspaper. It will unfortunately provide at least one tragic story of the mounting toll on our streets and highways. Seek out the real cause of the collision. You will be shockingly surprised how many times the owner of the car at fault was trying to get that last thousand miles out of a junkyard tire, thereby exacting the supreme price we pay for drivers who are not yet aware of the fact that the safest car on the road and its passengers are at the mercy of the worst junk heap that will run, where the public does not demand of its law makers the proper controls and from its enforcement officers strict enforcement for the safety of all against the negligence of the few.

MOTOR-VEHICLE DEATHS AND INJURIES BY STATES — 1957 and 1958

Forty-four states and the District of Columbia report their death and injury experience for seven months or less.

Injury totals and changes should be interpreted with some caution because of the effect of continuing changes in insurance laws and reporting requirements, efforts among many states to get more complete reporting, and increasing claims consciousness of those involved in accidents.

MOTOR-VEHICLE DEATHS AND INJURIES BY STATES
1957 and 1958

Months Reported	Deaths†† 1958	1957	Injuries†† 1958	1957	% Change 1957 to 1958 Deaths	Injuries	1958 Ratio of Injuries to Deaths
TOTAL U.S. **	16,672#	18,060#	722,535	702,153	— 8#	+ 3	43
Ala. 7	427	506	2,636†	2,800†	— 16	— 6	6
Ariz. 7	270	251	5,045	4,468	+ 8	+ 13	19
Ark. 7	227	273	1,960	1,704	— 17	+ 15	9
Calif. 7	1,885	1,991	75,338	76,715	— 5	— 2	40
Colo. 7	204	175	6,593	5,867	+ 17	+ 14	32
Conn. 7	107	150	11,957	11,634	— 29	+ 3	112
Del. 7	43	52	1,274	1,485	— 17	— 14	30
D. of C. 7	31	39	4,061	4,050	— 21	+ *	131
Fla. 6	550	528	16,148	16,585	+ 4	— 3	29
Ga. 7	492	529	8,518	6,191	— 7	+ 38	17
Idaho							
Ill. 7	950	1,161	54,288	51,296	— 18	+ 6	57
Ind. 7	507	589	19,906	21,827	— 14	— 9	39
Ia. 7	301	374	10,618	11,800	— 20	— 10	35
Kan. 7	291	290	8,192	6,057	+ *	+ 35	28
Ky. 7	411	439	8,003	7,848	— 6	+ 2	19
La.							
Maine 7	85	71	3,784	3,168	+ 20	+ 19	45
Md. 7	282	307	10,392	10,680	— 8	— 3	37
Mass. 6	253	207	44,276	42,282	+ 22	+ 5	175
Mich. 7	670	801	29,940	32,967	— 16	— 9	45
Minn. 7	372	342	14,114	12,676	+ 9	+ 11	38
Miss. 7	265	271	3,756	3,676	— 2	+ 2	14
Mo. 7	499	541	6,208	6,609	— 8	— 6	12
Mont. 5	65	74	901	844	— 12	+ 7	14
Neb. 7	180	153	5,075	5,147	+ 18	— 1	28
Nev.							
N. H. 7	45	49	3,052	3,127	— 8	— 2	68
N. J. 3	159	185	12,845	12,362	— 14	+ 4	81
N. M. 7	193	238	2,934	2,654	— 19	+ 11	15
N. Y. 7	1,137	1,105	152,518	138,726	+ 3	+ 10	134
N. C. 6	433	494	9,308	8,798	— 12	+ 6	21
N. D. 7	85	57	1,528	1,301	+ 49	+ 17	18
Ohio 7	957	1,092	41,199	44,403	— 12	— 7	43
Okla. 7	365	377	8,178	7,777	— 4	+ 5	23
Ore. 7	212	230	9,669	9,090	— 8	+ 6	46
Pa. 6	673	755	40,657	39,820	— 11	+ 2	60
R. I.							
S. C. 7	297	404	5,658	6,105	— 26	— 7	19
S. D. 2	36	12	510	335	+200	+ 52	14
Tenn. 7	390	343	8,035	7,427	+ 14	+ 8	21
Texas 7	1,209	1,385	35,658	35,184	— 13	+ 1	29
Utah 7	100	114	5,075	2,786	— 12	+ 10	51
Vt. 7	43	52	1,597	1,590	— 17	+ *	37
Va. 6	376	394	10,513	11,422	— 5	— 8	28
Wash. 7	294	253	15,210	13,565	+ 16	+ 12	52
W. Va. 7	179	264	3,977	4,212	— 32	— 6	22
Wis. 1	47	62	2,422	1,983	— 24	+ 22	52
Wyo. 7	77	83	1,209	1,190	— 7	+ 2	16

†Rural injuries only.

††All figures are preliminary. To insure proper comparisons, 1957 figures cover the same reporting period as those for 1958.

*Less than .5%.

**Death and injury totals cover reports for all months indicated in this column.

#Death totals and changes differ from national figures because those shown here are based on the states and months for which injury data are reported.

THE SAFETY LIBRARY

By Ruth Parks, Librarian, NSC

Books, pamphlets, and articles of interest to safety men.

Accidents

Drastic Night Accident Reduction on Chicago's South State Street. George Hollich. *Street Engineering*, p. 28-31+.

Commercial Vehicles

New B. C. Brake Regulations—No Hardship Committee Finds. *Motor Carrier*, p. 41-42, August, 1958.

(British Columbia regulation brings up-to-date equipment requirements to comply with ICC regulations.)

Shop Check Lists—Now You Can Really Gage Your PM Plant. *Fleet Owner*, p. 55-57+, October, 1958.

(Shop ratings of the 1958 ME award winners.)

10-Step Safety Program. *Fleet Owner*, p. 61-76, September, 1958.

(A 16-page special report on adding safety to your business formula for hiring and training drivers.)

Courtesy

Oregon's Good Samaritan. Hap Russell. *Motor Transportation*, p. 35+, September, 1958.

Drivers and Driving

Boys' Clubs Slate Auto-Safety Drive. *Automobile News*, p. 41, September 15, 1958.

(Program to reduce dangerous and irresponsible driving by teen-agers and adults.)

Magna Charta for Road Safety. *America*, p. 572-573, September 6, 1958.

(Editorial based on a pastoral letter issued by a bishop on Social Justice Sunday—Australia—dealing with "massacre on the roads.")

Enforcement

Radar in Traffic Enforcement. Wayne W. Bennett. *Traffic Quarterly*, p. 567-576.

(Discusses the enforcement of speed regulations in relation to the overall traffic enforcement problem.)

Grade Crossings

Rail-Highway Grade-Crossing Accidents, for the year ended December 31, 1957. 38 p. 1958. Interstate Commerce Commission, Bureau of Transport Economics and Statistics, Washington, D. C.

Highways

Mississippi's Pavement Surface Testing Program. A. M. White and Jack W. Chambliss. *Traffic Engineering*, p. 24-25, September, 1958.

Prestressing Promises—Nearly Joint-Free Concrete Highways. Ben Morrell. *Civil Engineering*, August, 1958, p. 34-37.

Insurance

Automobile Insurance Rates Make A Barometer of Accident Costs. A. E. Spottke. *Traffic Quarterly*, p. 523-542, October, 1958.

(Lowering economic highway accidents is the responsibility of every driver.)

Licensing

1958 Survey of State Requirements for Motor Vehicle Operators. American Optical Co., Southbridge, Mass.

Pedestrians

The Mooresville Plan: A New Traffic Idea—The Pedestrian Mall. Ridley T. Nichol. *Police*, p. 23-25, September-October, 1958.

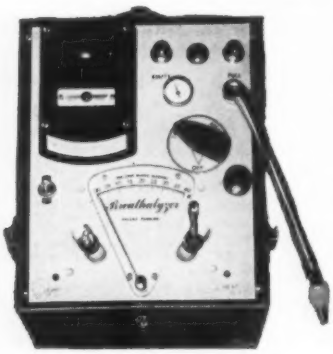
Photography

Photographic Instrumentation for Collision Injury Research. Derwyn M. Severy. Reprinted from the Journal of the Society of Motion Picture and Television Engineers, Feb. 1958, p. 69-77. Distributed by Institution of Transportation and Traffic Engineering, University of California, Los Angeles, Calif.

Point Systems

Illinois' New Traffic Violation Point System Explained. *Chicago Traffic Safety Review*, p. 1, 4. August, 1958.

BORKENSTEIN BREATHALYZERS



convict the guilty . . .
protect the innocent

The direct-recording BORKENSTEIN BREATHALYZER offers an infallible means of conviction or exoneration in suspected "under-the-influence" cases. It provides a permanent, unalterable record — with fingerprint — for documentary evidence.

Designed by a prominent authority on chemical breath testing, Captain Robert F. Borkenstein, of the Indiana State Police Laboratory, the BREATHALYZER is notable for:

1. **SIMPLE OPERATION**—7 easy steps learned in minutes.
2. **EASY MAINTENANCE**—clearly explained in simplified manual.
3. **HIGH STABILITY**—entire instrument operates independently of all variable conditions.
4. **STABLE SOLUTIONS**—possible variations in strength of only chemical used does not affect results.
5. **LOW COST PER TEST**—inexpensive supplies used are practically only overhead.
6. **SIMPLE TO EXPLAIN**—simple principle and design easy to explain in court room.

WRITE FOR FREE DEMONSTRATION OR PAMPHLET S-512

STEPHENSON CORPORATION
RED BANK NEW JERSEY

Circle Item No. 5—Reader Service Card

Michigan Traffic Violations Point System Now In Effect. Bulletin, *Traffic Safety Association of Detroit*, p. 1, September, 1958.

Police

Police Liability in Line-of-Duty Accidents. Robert L. Donigan and Edward C. Fisher. *Traffic Digest & Review*, p. 12-19, September, 1958. (Know The Law.)

Research

$5 Million Spent Yearly on Auto Safety Research. *Automotive News*, p. 2+, September 22, 1958.

Research As Applied to Traffic and Transportation. K. A. Stonex, *Traffic Engineering*, p. 15-21+, September, 1958.

Signs

National Standards for Regulation by States of Outdoor Advertising Signs, Displays and Services Adjacent to the National System of Interstate and Defense Highways. U. S. Department of Commerce, Bureau of Public Roads, Washington 25, D. C. (Reprint from Federal Register 23F.R.-6679—August 28, 1958.)

Street Lighting

Lighted Bypass Promotes Safety in Small City. *Street Engineering*, p. 14-15, October, 1958.

(Low-accident-rate expressway design attracts through traffic and relieves congestion in central city area.)

Modern Lighting, Fewer Accidents. Paul C. Bax. *Street Engineering*, p. 13-15, September, 1958.

(Kansas City's reward for a drop in night traffic accidents due to a progressive lighting program.)

Transportation

Health and Safety in Transportation. Ross A. McFarland. Public Health Reports, p. 662-680, August, 1958.

Vision

How Good Vision Test Should Be Conducted. *Police*, p. 54-57, September-October, 1958. (In Case You're Traffic Minded.)

ADDRESSES OF MAGAZINES MENTIONED

America
America Press
70 East 45th St.
New York 17, N. Y.

Automotive News
Slocum Publishing Co.
2666 Penobscot Bldg.
Detroit 26, Mich.

Bulletin
The Traffic Safety Association of Detroit
1902 Buhl Bldg.
Detroit, Mich.

Chicago Traffic Safety Review
Citizens Traffic Safety Board of Metropolitan Chicago
20 N. Wacker Drive
Chicago 6, Ill.

Civil Engineering
American Society of Civil Engineers
33 W. 39th St.
New York, N. Y.

Fleet Owner
McGraw-Hill Publishing Co.
330 W. 42nd St.
New York, N. Y.

Motor Carrier
Westrode Publications
1200 W. Pender St.
Vancouver 1, Canada

Motor Transportation
829 Roosevelt Bldg.
Los Angeles 17, Calif.

Police
Charles C. Thomas, Publisher
301-327 E. Lawrence Ave.
Springfield, Ill.

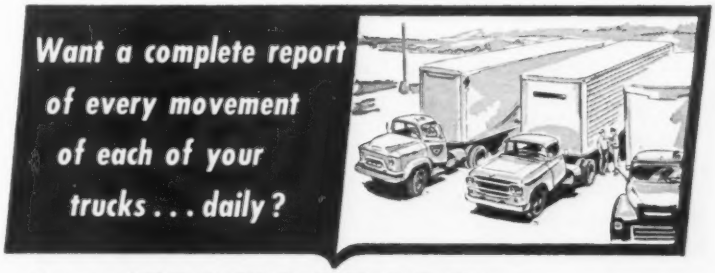
Public Health Reports
Public Health Service
Washington 25, D. C.

Street Engineering
Gillette Publishing Co.
22 W. Maple St.
Chicago 10, Ill.

Traffic Digest & Review
Traffic Institute
Northwestern University
1804 Hinman Ave.
Evanston, Ill.

Traffic Engineering
The Institute of Traffic Engineers
2029 K St., N. W.
Washington 6, D. C.

Traffic Quarterly
Eno Foundation
Saugatuck, Conn.



WAGNER-SANGAMO **TACHOGRAPH** "supervises" truck operation for less than 2¢ per trip

When you equip your fleet with TACHOGRAPHS, it's like having your supervisor ride on every truck . . . without leaving his desk.

A chart, costing less than 2 cents, placed inside the Tachograph at the start of each day or before each run, provides a graphic record of operation. These reports help reduce operating costs by encouraging better driving habits that save time, gas, oil, and tires.

Get details. Mail coupon for Bulletin SU-3.

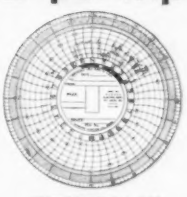
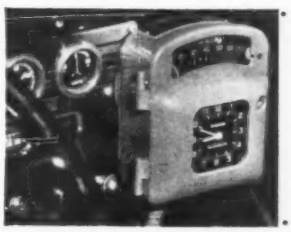


CHART TELLS ALL



Wagner Electric Corporation
6467 PLYMOUTH AVE. • ST. LOUIS 14, MO.
Please send a copy of Bulletin SU-3

Name_____
Company_____
Address_____
City_____ State_____
We operate_____ Vehicles WS58-8

Circle Item No. 6—Reader Service Card

Safety Pays Off For Newsmen

Three writers for large metropolitan daily newspapers in Virginia, Michigan and New York were named winners of the three $500 first place awards in the 1958 Newspaper Safety Writing Competition of the American Trucking Associations.

The grand prize winners were: James Baker of the *Richmond News Leader*, first in the single story category; Harry Taylor of the *Detroit Times*, first in the editorial class, and Walter Froehlich of the *Buffalo Courier-Express*, first for series of stories.

Nine cash prizes totaling $2,700 and 22 merit citations were given for articles and editorials which were judged most effective in promoting highway safety.

Second place prizes of $300 each were given to Mike Morgan of the *Miami (Fla.) Herald*, series; Gloria L. Negri of the *New Bedford (Mass.) Standard-Times*, single story, and Albert J. Pinder of the *Grinnell (Iowa) Herald-Register*, editorial.

The judges were Walter F. Carey, chairman of the board of directors, National Safety Council; John V. Horner, president of the National Press Club, and Joseph O. Mattson, president, Automotive Safety Foundation.

New State Agency For Missouri

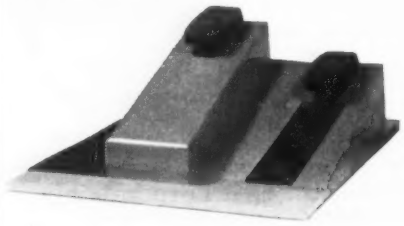
Governor James T. Blair, Jr., has appointed a governor's official coordinating committee on traffic safety for Missouri.

This committee, the Governor said, will be the state agency responsible for the official programs and for determining the official needs in traffic safety. It will provide guidance for the citizen leadership group. The Committee was formed as a result of recommendations from the President's Highway Safety Conference in Chicago, and the Governors' Conference Committee on Highway Safety.

Governor Blair said that he would personally serve as chairman of the co-ordinating committee and that Lieut. F. W. Shadwell of the public information and education section of the Missouri State Highway Patrol would be secretary of the official group.

Also organized in Missouri are the citizens that attended the Citizen-Leadership Conference of the President's Committee for Traffic Safety in Chicago in April. The group has now formally organized and selected as their name the Missouri Safety Council. Joseph R. Hogsett, a Kansas City attorney, is president.

Two years field tested. Now being used by Colleges, Fleet owners, Fire, Police, State, and School Departments.



CHECK ✔ your Personnel with

THE FULLY AUTOMATIC TIME REACTION TESTER

(Pat. applied for in the U. S. & Canada).

- **It starts**
- **It stops**
- **It resets Automatically.**

Complete unit weighs only 15 pounds.

Dial in plain sight, graduated in 1/100s of a second.

Steel cabinet, DeLuxe Sloping panel, Marine Gray Ripple Finish, Size 8" x 8" x 10".

For details write

STANLEY L. HEYLMUN, Incorporated

4945 Edgemere Avenue **Baltimore 15, Maryland**

Circle Item No. 7—Reader Service Card

New Disney Film

A mythical town overrun with a very real traffic fatality record and the method used to overcome the problem is the basis for Walt Disney's newest humorous and thought provoking film, *The Story of Anyburg, U.S.A.*

With the release of *The Story of Anyburg, U.S.A.*, Disney completes a trilogy of safety films each in full animation—each taking a light approach (and deadly aim) on basic safety problems. *Motor Mania*, starring Goofy in a dual role as the mild-mannered pedestrian as well as the maniacal driver, inaugurated the series. Donald Duck, starring in *How to Have an Accident in The Home*, was the second in the group and proved conclusively that ". . . accidents don't just happen by themselves—they have to be carelessly planned in advance." *Anyburg, U.S.A.* stars Disney's newest character—the Defense Lawyer — who neatly and effectively spotlights the criminal-at-large on today's highways.

Anyburg, U.S.A. is available for long term lease or daily rental through the Educational Film Div., Walt Disney Productions, Burbank, Calif.

Mortar Board Patrol

From Page 24

funds for police traffic training, as do some local safety councils. The Traffic Law Enforcement Foundation at Southern Methodist University is similarly engaged.

A physician of Edina, Minn., in appreciation of the efforts of the police of that city, created a fund in memory of his son who was killed in a traffic accident. It is used to train selected officers in both area and national traffic schools.

Specialists of the Indiana State Police are able to improve their skills by funds made available by the Women's Auxiliary of the Indiana State Medical Association.

A motorcycle dealer in Miami, Fla., purchased copies of the Institute's Traffic Accident Investigation Manual and unit publications dealing with patrol techniques which he made available to all motorcycle officers of Dade county.

Universities and state departments of education are making available their technical staffs to aid traffic police training.

The current trend is towards greater utilization of educational facilities in the training of supervisory police officers. They have trained instructors and staffs which are experienced in course development and selection of the most effective teaching methods. By combining these facilities and the knowledge of specialists from the traffic policing field, highly satisfactory training programs are being offered.

In Iowa, training is offered by the Institute of Public Affairs at the State University. The California State Department of Education directs the California program for Peace Officer Training. In South Carolina, the State Law Enforcement Division and the university have combined to offer an extensive program including traffic.

Other programs are offered by the University of Maryland, the Public Safety Institute of Purdue University, the Public Service Training Center at the University of Florida, and the Highway Traffic Safety Center at Michigan State University.

A complete listing of highway traffic training services offered by universities is contained in a recent publication, "Courses in Highway Safety and Highway Traffic, A Directory of College and University Offerings," which may be obtained from the National Commission on Safety Education, National Education Association, 1201 Sixteenth St. N. W., Washington 6, D. C. The price is $1.00.

A police chief accountable for maintaining public safety is dependent upon his men to produce the kind and amount of police service which builds public safety.

Directing the efforts and assuring the effectiveness of each officer is a major requirement.

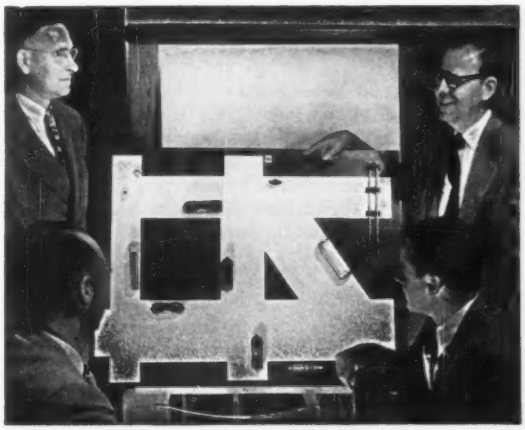
"Enough men for traffic" is an often heard request. Yet, it is one not likely to occur—ever.

Better results from available manpower through improved training at all levels on a continuous program basis is the answer.

Youth Group Launches Auto Safety Program

Education by example will be stressed in a program to be conducted by the Boys' Clubs of America in more than 300 communities throughout the country. Youngsters will be taught correct traffic safety attitudes through model cars and soap-box derby programs. Teenagers will be taught indirectly, with emphasis on the mechanics and economics of automobile operation.

The new program is being made possible by a grant from the Automotive Safety Foundation for the development of a manual on automotive activities for teenagers. After Boys' Club members have become thoroughly indoctrinated in the facts of traffic safety, they will initiate and take part in community-wide safe driving campaigns.



THE "EYES" HAVE IT . . . .

Here is an aid that has proven practical in teaching visually the principles of safety. It's simple, effective and works wonders in teaching your drivers.
The MAGNO SAF-T BOARD is the result of studies by outstanding safety instructors and engineers. Safety directors, traffic managers, driving instructors, insurance agents and adjusters get a clear picture of how accidents occurred visually by reconstruction of conditions.
It is now being used from coast to coast by fleet owners, insurance and public utility companies, colleges and schools, and many other concerns interested in public safety. Consisting of a BOARD with typical street intersections on one side. The other side is a BLACKBOARD on which any street or road situation can be drawn with chalk and then erased. It has scale models of vehicles, traffic markers and accessories that can be placed in any conceivable traffic situation.

Write for our folder. It contains full information.

MAGNO SAF-T BOARD© **EMIGSVILLE, PA.**

Circle Item No. 8—Reader Service Card

NEW... SAFETY EQUIPMENT

Publication of product announcements in this section should not be construed as endorsement or approval by the National Safety Council.

Highway Marking Sign

A new "Panelescent" lamp superhighway marking sign offers greater driver readability than conventional lighted signs at one-half the power consumption cost. The letters of the sign are their own light source with each letter composed from one to three individual Panelescent lamps. The Panelescent lamp produces light over the entire surface of a panel by the principle of electroluminescence—the creation of light through the excitation of certain phosphors placed in an electric field. Only 1/16 in. thick, the lamp produces a uniform light without the use of bulbs, tubes, filaments, cathodes, or heavy ballasting devices. Its construction consists of a porcelainized steel sheet with a ceramic-phosphor coating. The bright beam of light in the center of the time exposure picture on the right results from the head lights of passing automobiles. The lamp letters of the 16 x 4-ft. sign are mounted on a marine plywood backing and completely covered with an aluminum plexiglass window. The upper-case letters are 18 inches high and the lower-case letters are 12 inches high. The sign operates with a 580 volt control device on conventional 60 cycle, 115-120 volt supply. The sign is expected to have wide applications in marking highway turn-offs, routes, mileage and traffic warnings.

Sylvania Electric Products, 1740 Broadway, New York 19, N. Y. (Item 41)

Reaction Timer

This reaction timer is a complete, self-contained unit that measures, by means of psychophysical testing, both simple and complex driver reaction time. It determines reaction time limitations quickly, scientifically and accurately. Utilizing colored lights that represent traffic signals, and realistic car controls, the easy-to-operate reaction timer simulates actual driving conditions for the subject. It measures simple reaction time by testing the subject's response to a signal he knows in advance; measures complex reaction time by requiring the subject to respond differently to a choice of signals, thus injecting a "think factor" before the response. Test scores are then compared with scientifically determined safe reaction time margins, at given car speeds, for stopping, following, obeying road signs and meeting other highway emergencies. Each driver learns his reaction time limitations in relation to the mathematics of the highway and is trained to compensate his behind-the-wheel habits accordingly. The reaction timer was developed to augment other driver testing and training equipment used in highway safety programs. It is compactly designed and precision-engineered, completely portable, and is self-contained in a sturdy, handsome leatherette carrying case. The reaction timer operates on 110 volts, 60 cycle, A. C. curretn.

Porto-Clinic Instruments, Inc., 298 Broadway, New York 7, N. Y. (Item 42)

Audio Amplifier

A new, completely transistorized 20-watt audio amplifier designed for multi-purpose public safety applications has been developed. The new equipment may be used as a public address system and may be applied as a monitor with mobile radio systems to amplify messages for operators who have to leave their cars. The unit also is designed for operation for siren purposes and is engineered so that a siren, supplied as optional equipment, will fit inside the audio amplifier itself. If used in a siren application, an ON/OFF switch starts and stops the siren instantly, eliminating buildup or rundown problems. The amplifier may be installed for use with any conventional type of mobile radio, old or new, or it can be used independent of the radio system as a public address or siren system for emergency vehicles or for traffic and crowd control. The unit gives sufficient voice amplification to make instructions audible up to three typical city blocks from the vehicle on which the equipment is installed. A separate switch is provided for control of the siren. Regardless of which position the 3-way switch is in, the siren control disables only the public address function and permits operation of the siren at full output. An automatic warble is included so there is no need for the operator to perform this function manually.

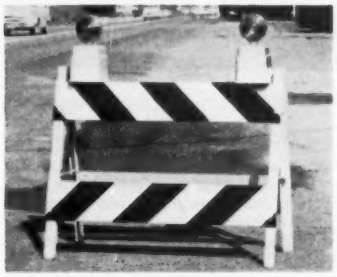
General Electric, Communication Products Dept., Electronics Park, Syracuse, N. Y. (Item 43)

Towing Chain

A new general purpose towing chain is now available through hardware and allied products dealers. Long-lasting and lightweight, the 14 ft. chain is preassembled with a grab hook at each end. The chain can be used as a driveway barrier, tool guard, auto trailer safety chain, and for many other uses. It comes individually packaged in attractive bright yellow cartons.

The McKay Co., 1005 Liberty Ave., Pittsburgh 22, Pa. (Item 44)

For More Information—Circle Item on the Reader Service Postcard



Folding Barricade

A folding barricade for use on highway and construction projects or industrial maintenance jobs is painted yellow and black and meets state highway safety specifications. In addition, the barricade is non-collapsible—even when subjected to wind pressure from large trucks. Sturdily constructed for long durability under severest weather conditions, the barricade has steel legs, marine plywood cross bars, and the flasher light bolts on so that it is tamper-proof and theft-proof. The flasher light included with the folding barricade kit is a new model with visibility extended 103 per cent in both neon and transistorized models. Light is available with a standard 4¼-inch head, 7-inch head, or 360° dome-type head. The parabolic reflector can be substituted for one of the 7-inch lenses if desired.

Pacific Mercury, 14052 Burbank Blvd., Van Nuys, Calif. (Item 45)

Patrol-Lite

"Patrol-Lite" is a rugged tubular steel portable hand truck with two 7-in. amber lights which flash alternately. The lights are operated by a regular 6-volt battery, which is in a tamperproof locked box. A recharging unit is included with each "Patrol-Lite." A new feature is the large 24-in. square yellow baked enamel sign panel, which is worded in large easy-to-read black letters to meet municipal, county or state requirements. School safety programs can be made more effective with this type of equipment. Street or highway repairs, snow removal, and roadblocks or detours can all be made safer for employees and motorists with "Patrol-Lite." Fire and police traffic control at emergencies is easier and safer with a warning flasher worded to direct motorists away from the scene.

Patrol-Lite, Div. American Mfg. Corp., Box 266, Warsaw, Ind. (Item 46)

Pocket-Size Radio

This pocket-size, two-way radio that transforms a policeman, fireman or construction worker into a "walking radio station," can be clipped to a belt or carried in a pocket. It is comprised of a 10-ounce transistorized receiver and a 28-ounce transmitter, and has a range up to two miles in communication with mobile units or even longer with fixed stations. The 2-way radio is a self-contained station operating in the 150 megacycle band. The fully transistorized receiver measures only 6½" in its largest dimension. Power is supplied by a single small battery with a life of 150 hours. Either a small lapel speaker or earpiece may be used. The frequency modulation transmitter is only slightly larger than the receiver. Transmissions are made by means of a small carbon-type microphone with a push-to-talk button. The belt-radio-equipped policeman can summon help from any spot on his beat, and the fireman can maintain constant touch with his chief or control point. In addition, the wearer may speak directly to other belt radio units through an instantaneous repeater, which picks up his transmission and relays it in amplified form.

Radio Corp. of America, 30 Rockefeller Plaza, New York 20, N. Y. (Item 47)

Aluminum Guard Rail

After a one-year test, the first commercial installation of aluminum guard rail will be made at the Miami International Airport. The manufacturer claims that it opens the way for the use of the new product on highways throughout the United States.

Aluminum already is widely used for bridge railing, signs, overhead trusses, lighting standards, and other highway accessories. The pioneer installation of aluminum guard rail was deliberately located near corrosive tidewaters and results of a year's testing indicate that aluminum is ideal for this use.

In addition to corrosion tests, the guard rail was subjected to impact tests by an automobile at speeds up to 60 miles per hour. The aluminum rail stood up well and indications are that aluminum has a decided advantage over other materials in absorbing impact energy.

The guard rail is formed from 6061-T6 aluminum alloy sheet in a 12 gauge specification. The railing is of universal deep beam design and is bolted to concrete posts at conventional 12½ ft. intervals.

Among the advantages of aluminum for this application are its freedom from rust and corrosion and its light weight.

Reynolds Metals Co., Metals Bldg., Richmond 18, Va. (Item 48)

News Items

R. E. Dietz Company

Robert J. Muir has joined the sales engineering staff of the Hazard Warning Lighting Division of this Syracuse, New York manufacturer.

Mr. Muir will cover New England, and eastern New York and Pennsylvania. He will service contractors, states and utilities on hazard warning problems and handle company distributors.

For More Information—Circle Item on the Reader Service Postcard

SAFETY PRODUCT LITERATURE

Highway Lighting Standards and Sign Supports

Representative types of aluminum and steel Monotube pole designs especially engineered to provide adequate lighting standards and improved direction signs for streets and expressways, are fully described in Folder LS-23. The Union Metal Mfg. Co., Canton 5, Ohio.

For more details circle No. 81 on enclosed return postal card.

Remove Traffic Obstructions

When stalled vehicles or wrecked cars retard normal traffic flow, dispatch your Holmes wrecker to the site. Working safely, confidently and efficiently, it will clear the area in record time. A wide range of models is available to meet every need. Literature gives full details. Ernest Holmes Co., Chattanooga 7, Tenn.

For more details circle No. 82 on enclosed return postal card.

Speeds Snow Removal

Reversible, one-way or V, Good Roads snow plows assure fast, smooth, efficient removal of snow, even under adverse conditions. These rugged, heavy-duty units are fully described in literature. Good Roads Machinery Corp., Minerva, Ohio.

For more details circle No. 83 on enclosed return postal card.

Public Safety Signs

Caution signs can prevent accidents before they happen. Eastern Metal of Elmira, Inc., Elmira Heights 1, N. Y., manufactures a full complement of safety signs —over 2200 types and legends. They are made of durable all-steel construction with weatherproof baked enamel finish.

For more details circle No. 84 on enclosed return postal card.

Protects Municipal Service Vehicles

Maintenance and service trucks when stopped for necessary work often become victims of highway hazards. To avoid this, equip them with a Beacon Ray warning light. By alerting unwary motorists, it averts accidents, damage to equipment and work slow downs. Catalog gives full details. Federal Sign and Signal Corp., 8725 S. State St., Chicago 19, Illinois.

For more details circle No. 85 on enclosed return postal card.

Warning Lights

Catalog No. 58-59 will serve as a handy reference for police, fire and municipal street maintenance departments. It gives comprehensive information on the use and maintenance of portable and hazard warning lighting equipment. Portable & Hazard Lighting Div., R. E. Dietz Co., 114 Leavenworth Ave., Syracuse, N. Y.

For more details circle No. 86 on enclosed return postal card.

Catalogs Police Needs

Nearly everything to adequately meet the needs of municipal police is included in the 1958-59 edition of "Police Equipment Catalog," published by Sargent-Sowell, Inc., 1172 107th St., P.O. Box 868, Grand Prairie, Texas.

For more details circle No. 87 on enclosed return postal card.

Reflective Traffic Markings

Bulletins PX56, 354, G558 and P256 describe reflective markings for every municipal traffic use. Respectively, they deal with Plastix Discs for cross-walks and safety zones; reflective striping and compounds for pavement markings; moisture-proof glass spheres for reflectorizing traffic paint; and Prismo "200" sign finish for traffic signs. Prismo Safety Corp., Huntington, Pa.

For more details circle No. 88 on enclosed return postal card.

Better Weed and Brush Control

Chemical-spraying roadside weeds and brush with a Model 20-HW highway roadside sprayer assures effective and economical control. Catalog L-1430 discusses the 1000-gallon capacity unit and gives facts on sprayer accessories. John Bean Div., Food Machinery & Chemical Corp., Lansing 4, Mich.

For more details circle No. 89 on enclosed return postal card.

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Lite-Guard flashers and barricades give trouble-free performance that assures dependable protection. The "Big 7" flasher has a battery life of over 3000 hours, offers two or one-way light direction, and is available in amber or red. The 30-inch high, heavy-gauge steel barricade is equipped with Scotchlite for better visibility. Park Industries, Inc., 4328 Oakwood Blvd., Melvindale, Mich.

For more details circle No. 90 on enclosed return postal card.

Two-Way Police Radio

Research and experience contribute heavily toward making Motorola 2-way police radio rugged, dependable and long lived. Literature gives the full story on these carefully engineered, thoroughly field-tested public safety units. Motorola Communications & Electronics, Inc., 4501 Augusta Blvd., Chicago 5, Ill.

For more details circle No. 91 on enclosed return postal card.

Daylight Turns 'Em On and Off

Sun Switch turns street lights on and off automatically in accordance with daylight intensity. This unit is adaptable to luminaires, pole or cross-arm, ballast or pole-top installations. Literature gives full details. Sun Switch Div., Ripley Co., Inc., Middletown, Conn.

For more details circle No. 92 on enclosed return postal card.

Battery-Mounted Portable Lamp

Newest addition to the Big Beam line is the "Mounty." This portable electric hand lamp is powered by any 6-volt twin-pack lantern battery. Its flashing beacon can be used in horizontal or upright position and its high-powered beam is visible from one mile away. Literature gives full details. U-C-Lite Mfg. Co., 1050 Hubbard St., Chicago 22, Ill.

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Effective Traffic Control

The El-Tec radio interconnection system provides complete traffic control in three important ways: traffic programming, control from emergency vehicles, CD evacuation control. Literature gives full details. Electronic Protection, Inc., 2097 N. Hawthorne Ave., Melrose Park, Ill.

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"Traffic Sentry"

Bulletin describes a portable traffic signal that can be rolled, hauled or taken by truck by one man to any location needing full traffic signal protection. Portable Traffic Signals, Inc., 1615 S. Broadway, Los Angeles 15, Calif.

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Safety Awards

Safe Driver Awards, Emblems, Plaques, and Pins, in many styles and sizes, are presented in a brochure available from Williams Jewelry & Mfg. Co., 10 South Wabash Ave., Chicago 3, Ill. Each item is pictured along with a complete description including sizes, components, and prices.

For more details circle No. 97 on enclosed return postal card.

Safety Patrol Equipment

Belts, caps, helmets, badges, arm brassards, raincoats, caution flags, trafficones, any many other safety patrol items are illustrated and described in this catalog, available from Graubard's, Inc., 236 High St., Newark 2, N. J.

For more details circle No. 98 on enclosed return postal card.

School Bus Roadeo

From Page 32

tribution to safety and efficiency in the over-all operation of the pupil transportation system in North Carolina.

It has also been gratifying to observe that numerous students have been able to continue their education as a result of the scholarships provided through this program. We have followed the progress of students who have won scholarships and in each case they have made outstanding records in the training schools and colleges they have entered.

In addition to the stated objectives, the program provides an important educational and social experience for the contestants. The roadeo gives many students their first opportunity to travel outside their immediate community and associate with students from all parts of the state. The stay in Chapel Hill also provides them a first-hand look at college life.

Another gratifying feature of the roadeo is the extensive interest that had been created among school officials as well as students. In some respects, it is similar to the competitive spirit demonstrated in athletic events leading to district and state championships. A keen competitive spirit is present at each event.

Certainly, we do not consider the roadeo to be the final answer to problems related to the safe transportation of students to and from the public schools of North Carolina. It is, however, another means whereby we can supplement our training program for school bus drivers and contribute to the state's over-all effort to make its pupil transportation system as safe and efficient as possible.

Book Reviews

From Page 2

two people in the nation today will be injured or killed in traffic sometime in the future."

The book not only goes into factors involving safety—the driver, natural physical laws, man-made laws, the art of driving — but also discusses economy, insurance, and our legal responsibilities. In short, *Better Driving* is a brief but thorough guide to how to drive your automobile and live through it and how to keep operating costs down. The book is well-indexed and interestingly illustrated.

—Edwin L. Kirby
Editor, Traffic Inventory Section
National Safety Congress

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Operation Road Watch

From Page 16

at a time when most weekend traffic fatals occur. It meant hundreds of enforcement officials must work overtime and that communications must be kept open to verify licenses and registrations during the three-hour period.

With public and police briefed, Riley's countdown began. Four days after the announcement the plan was endorsed by the Massachusetts Police Chiefs Association. On Aug. 12 the alert went out and the next day the press was tipped off that "Operation Road Watch One" was imminent. On Aug. 15 orders were issued to start rolling at 1 a.m., Sunday, Aug. 16. At midnight Saturday there was a brief flurry of activity on the highways as those who somehow got the word scurried home to escape the road blocks. Then at 1 o'clock the teams moved into position with Riley and Lt. Col. John Blake, executive officer of the State Police, observing the operation.

When each car was inspected a white circular sticker with a figure one was slapped on the lower right corner of the car windshield so it would not be detained at another check point. Motorists were instructed to tear if off the next day. But that would not remove the chance of another Road Watch operation. They could be sure Riley was up in his Boston registry office brewing another tea party.

Madison Avenue and U.S. 1

From Page 10

says, the only real way we know to correct anger is through love.

Dr. William Menninger of the Menninger Foundation in Topeka says accidents are often a symptom, and he thinks maybe people should be made aware of this. Careless driving is often a symptom of immaturity, he says or it may be symptomatic of wanting to punish oneself for either conscious or unconscious reasons. There is no doubt, he thinks, that a higher percentage of accidents are related to personality problems.

Dr. Richard Hoffmann of New York disagrees with the theory that certain people are "accident prone." He takes the very practical view that the chief causes of accidents are inattention, fatigue and carelessness. But, he says, a troubled mind causes inattention, and anger produces carelessness.

The point made by all three of these eminent psychiatrists is that the state of mind of the driver is an all-important factor. The attitude of the man behind the wheel is what must concern us. Anger kills more motorists than blowouts—and anger can't be detected by safety inspections. Motorists pull to the side of the road if they are sleepy; perhaps they should likewise pull over when in inner turmoil.

All of us interested in safety, working as a team, have made some progress. The mileage death rate at the start of this traffic safety campaign in 1946 was 9.8. Last year it was down to 5.9. If the mileage death rate had remained at the 1946 level, 155,000 more people would have died in traffic accidents last year alone. This is equal to the population of Raleigh, N. C.

It is a very great satisfaction to The Advertising Council to have been a partner in the organized safety movement all these years, and to have played even a small part in preventing so many American tragedies.

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RESEARCH REVIEW

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AUTOMOBILE ACCIDENTS AND DRIVER BEHAVIOR

by Jean K. Boek, Ph.D.
Director of Research, New York State Youth Commission

This is a report of research in which a sample of drivers of Schenectady, N. Y., was interviewed and observed to learn how those who had accidents compared with those who had not.[1] The project was guided by an inter-disciplinary committee composed of engineers, cultural anthropologists, epidemiologists, and biostatisticians.[2] It was preceded by pilot studies in Oneonta, Saratoga Springs, and West Sands Lake, N. Y.[3]

The work was in two phases. In Phase I, a representative sample of drivers living in Schenectady was interviewed in their homes with a schedule of questions. In Phase II, another sample of drivers, who represented operators of passenger cars actively on the streets, was followed and observed without their knowing it as they drove.

A driver in this study was anyone 16 years of age and over, who had operated a motor vehicle at any time from January 1, 1953, through June 30, 1955. An accident was defined as a motor vehicle mishap, occurring during that same period, involving $50 or more damage and/or personal injury, that was on file with the New York State Bureau of Motor Vehicles.

Phase I
Driver Interviews

Method

The drivers were selected by area probability techniques, and were interviewed between July 7, 1955, and February 20, 1956.[4] During the hour or more of the interview, seven types of questions were used to determine the number of miles driven since generalizations about factors related to accidents must consider the risk of exposure to accidents. (1) In one type of question, the respondent was asked to furnish the odometer reading of the vehicle or vehicles being driven at present, and the reading when he first started to drive that vehicle. Readings were secured for all vehicles driven since January 1, 1953. From these, an average monthly mileage was computed for that driver after readings for others operating the same vehicles had been subtracted. (2) A second type of detailed questioning dealt with purpose and amount of all driving done from January through June of 1955. (3) Similar inquiries about driving to work, shopping, on vacations and other purposes were made for 1954. (4) Before these 1954 questions, respondents were questioned about the total mileage they had driven during that entire year. (5) Since pretesting had shown the difficulty of obtaining detailed answers about driving for more than 18 months prior to time of interview, therefore, 1953 mileage was obtained through the query, "How much more or how much less did you drive in 1953 than in 1954?" (6) Questions about mileage, time and destination were asked in detail for the most recent day the person had driven. (7) A final method of securing mileage was through a diary kept by drivers for approximately four weeks after the interview.[5]

1. This article summarizes method and most important findings from the complete report.

2. Acknowledgment is given to the agencies making possible the data gathering and to the principal representatives of each who formed the inter-departmental committee: United States Bureau of Public Roads —Messrs. Charles W. Prisk and Emmett L. Paige; New York State Dept. of Health—Drs. Walter E. Boek and William G. Beadenkopf; New York State Dept. of Public Works—Messrs. C. E. Billion and E. C. Cross, Jr. Cooperation was given by the New York State Bureau of Motor Vehicles through its Commissioner, Mr. Joseph P. Kelly, and by the citizens and officials of the city of Schenectady, as represented by former Mayor Archibald C. Wemple and City Manager Arthur Blessing. Analyses on which this report is based were done with a grant from the Automotive Safety Foundation through its President, Mr. J. O. Mattson. The help of many others who are not listed was also necessary for the work. The author was project director.

3. Results of the pilot studies are given in these references:
Herman E. Hilleboe and George James. "The Human Factor in Motor Vehicle Accidents." *State Government*. Chicago. The Council of State Governments. March, 1955.
William G. Beadenkopf, Adele K. Polan, Walter E. Boek, Robert F. Korns, and George James. "An Epidemiological Approach to Traffic Accidents." *Public Health Reports*. Vol. 71, No. 1. January, 1956. Pages 15-24.
C. E. Billion and E. C. Cross, Jr. "The Relation of Accidents to Speed Habits and Other Characteristics of Drivers." New York State Dept. of Public Works in cooperation with the United States Bureau of Public Roads. Presented at the Highway Research Board Annual Meeting, January, 1955. Albany, N. Y. Mimeographed Report.

4. The sampling procedure was to number the city blocks on a map before selecting, with a table of random numbers, one subsample of heavily populated blocks, and another of more lightly-populated blocks. At the site of each selected block, the interviewer checked street and other boundaries before marking down each household or apartment on his outline map of that block. Using a random start from the southwest corner, he contacted every fourth household to learn if it contained one or more drivers. If there were none, only age and sex of household members was secured. Where there were drivers, random methods were employed for choosing the eldest, second, or third eldest drivers in the households. When the selected driver was not at home during the first contact, return visits were made until an interview could be secured.
Experience with this sampling substantiated work of Dr. Julius S. Prince and others in demonstrating the incompleteness of the City Directory and the difficulty of using Census Block Statistics.

5. When the interview had been completed, drivers were asked if they would be willing to record total miles driven each day on the mimeographed form given to them. At the end of each week, contact was made with each driver by phone, post card or visit in order to secure an office record of their daily driving.

In addition to mileage questions, drivers were asked what they thought of various driving and traffic conditions, how they drove under different circumstances, and about their health, schooling, income, accidents and other matters. After the visit, the interviewer gave them a social status rating based on a house and neighborhood scale.

Photostats were made of accident records on file for these drivers in the Bureau of Motor Vehicles and these were judged for accident responsibility by at least three persons.[6] A person was considered responsible for the accident in which he was involved if any percentage of responsibility was assigned to him. Where no responsibility was assigned by three out of five judges, the person was considered not responsible for his accident.

After each completed interview schedule had been edited by the Project Director, mileage and other data were processed and coded for machine tabulation. During this operation, an unevenness was noted in the manner in which various questions about mileage were answered. For example, many drivers who could give specific purpose and mileage for trips and driving errands for a whole year were unable to reach a total estimate for that same year or had no idea of their odometer readings. Fortunately, periods for which mileages were needed were covered by more than one type of questioning. Therefore, a system was devised whereby the two or three mileages for the same period were averaged.[7] Where only one figure was available on an individual's record, this single figure was used as the mileage for that period. This mileage was then added to figures for the other two periods, to give a total for the two and a half year period.

Results of Phase I

Comparison of Drivers and Non-drivers

A total of 1567 households were contacted in Schenectady. These represented a randomly selected sample of all households in the city. From drivers in these households, a random sample of 810 was selected and interviewed. Basic data procured from each household made it possible to compare sex and age of drivers with persons in that city who did not drive.

Male drivers and non-drivers. Twenty out of every 30 men in Schenectady 16 years and over were drivers and their average age was 40.7 years compared to the significantly higher age of 52.6 years of non-drivers. For the age range of 16-19, 47 per cent of all men drove, and in the 20-29 range, 86 per cent were drivers. (Table 1) From this peak, there was a constant decrease in each decade, until by age 80-89, only 8 per cent of the men drove.

Table I. Drivers Interviewed in Schenectady.
Percentage in each age group of all men and all women who were drivers.

	Per Cent of Age Groups							
	16-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89
Men	47	86	81	79	71	42	19	8
Women	27	42	34	31	18	15	5	—

Female drivers and non-drivers. Eight out of every 30 women 16 years and over were drivers, and their mean age was 36.5 years compared to the significantly higher 46.5 years for non-drivers. In the 16-19 year range, 27 per cent drove, compared to 42 per cent in the 20-29 year range. The decline with succeeding decades was similar to the pattern observed for men in Table 1, except that in the 80-89 decade there were no women driving.

All drivers and non-drivers. Analysis showed that in every 100 Schenectady households would be found approximately 305 persons, of whom about 225 would be of driving age (16 and over). The number of men in this potential driving population would be 102, and the number of women, 123. Eighty of the 102 men would be drivers as would be 46 of the 123 women. This meant that of all persons of any age in this city, 26 per cent would be male drivers (80/305) and 16 per cent would be female drivers (46/305). On this basis, 41 per cent of all residents of the city would operate motor vehicles.

Accident Reporting

During the interviews, drivers were asked if they had ever been involved in automobile accidents. A total of 359 (44 per cent) had had from one to seven accidents while they were driving. An additional 29 person had had one to three accidents, but they were not driving. The 359 were then asked further about accidents since January, 1953, since this corresponded to the period for which records were available from the Bureau of Motor Vehicles (BMV).

When it was found that 150 drivers said they had been in one or more accidents since January 1953, compared to 119 drivers reported by the BMV, exhaustive tabulations were made to check reasons for the discrepancy between the two sources. Tabulation of dates of accidents showed that all of those mentioned during interviewing were within the period for which the BMV was being searched. In terms of accident location, only nine said theirs had occurred outside of New York State, which meant their records would be unavailable to the study.

Of the 150 persons mentioning accidents, 121 had one, 26 had two, and three had three, a total of 182 accidents. Of the 119 BMV reported accidents, 106 drivers had one, 11 had two and two had three for a total of 134 accidents. Comparison of accident reporting for each driver showed agreement between interview and BMV data in only 44 instances. Partial agreement was present for 19 other drivers in that each source placed these drivers in the accident category, but with the number of accidents being different. (In two of these instances where respondents listed two accidents and the BMV one, one of the accidents had occurred outside of New York State.) However, 87 other

6. Persons judging accident records for responsibility were members of the New York State Dept. of Health and of Public Works. An accident record was evaluated separately by three persons. If they agreed in their assignment of responsibility or no responsibility, no further judging was done on that record. If they disagreed, the record was sent to two other persons for judgment in order to secure agreement in at least three out of five evaluations.

7. The two and one-half years for which mileages were obtained were divided during interviewing and analyses into the year of 1953, the year 1954, and the first six months of 1955.

drivers who mentioned accidents were not listed by the BMV, and an additional 56, who did not mention their accidents during the interview, were reported by the BMV.

Of the 182 interview-reported accidents, 119 had been sent for filing to the BMV, 29 had not been, and for 34 there was uncertainty or no information about the filing. Six of the 119 accidents, one of the 29, and two of the 34 had occurred outside of N. Y. State, but all were eligible for filing. Of the 113 sent to the New York State BMV, 57 were not available to this project. Of these 57, 40 should have been included because they met the formally stated BMV requirements of $50 or more damage and/or personal injury. On the other hand, six accident reports on file in the BMV should not have been because they did not meet the criteria. Among the 29 accidents not reported by respondents, three were on file in the BMV, although two apparently did not meet filing standards. Of the remaining 26 not on file, 17 did not have to be, but six others should have been. For two of the 26, there was doubt about necessity of inclusion.

On the chance that accidents reported by respondents as involving only their own cars might be disproportionately high among those unavailable from the BMV, a tally was made of the 20 one-car accidents mentioned in interviewing. Of these, seven had been reported to the BMV. Three of the seven were available from the BMV for the project, two should have been but were not, one did not have to be, and there was doubt about eligibility of the other. Nine were not reported to the BMV, but only two should have been. Reporting for four was uncertain, and of these one was available for the research, two should have been, and one occurred outside of New York State. Thus, two of the 20 one-car accidents which should have been reported to the BMV had not been. This was a somewhat higher proportion than the six unreported accidents that met filing criteria in the total group of 182 accidents.

Thus, the foregoing analysis revealed that 40 accidents reported in interviews should have been available from BMV files but were not. At least eight sent from the BMV did not meet their own basic criteria and should not have been filed.

In view of this, two test tabulations were made in which all drivers having accidents meeting the criteria of $50 or more damage and/or personal injury were compared with the rest. A total of 206 drivers had been in accidents, according to interview and BMV data, but 52 of these who had accidents which did not meet the criteria were put into the non-accident group. A comparison by sex of the resulting "pure" group of 154 accident-drivers with the 656 non-accident drivers revealed significantly more men being involved in accidents than women. Similar results are shown later in this report when the 119 BMV-reported accident-drivers are compared with 691 non-accident drivers. Comparison of the 154 and the 656 by total mileage showed a trend for the proportion of accident-involved drivers to increase as mileage went up—a result also comparable with that based on use of BMV records alone.

Miles Driven and Accidents

Results in this section and in the remainder of this report are based upon the use of New York State Bureau of Motor Vehicle records through which 119 drivers were identified as being involved in accidents. Of these 119, 82 were judged as being responsible for their accident or accidents, and 37 were judged as being not responsible for the accidents in which they were involved.

One of the first hypotheses tested was that the more a person drives the more likely he is to have an accident. The greatest number of miles driven in the two and one-half year period was 161,644 by one person, with the median being 12,680. This latter figure is equivalent to 5,052 miles per year. Percentages computed for drivers in each successive 1000-mile category, according to their classification of no accident, accident involved but not responsible, and accident involved and responsible, revealed a gradual tendency for the percentage of drivers having no accidents to decrease as mileage went up. The 810 drivers were then arranged on a mileage continuum and then divided into six groups of 135 each. Determining the significance of differences among proportions indicated that persons driving the lower mileages had fewer accidents.[8] This finding was significant at the one per cent level. A similar difference resulted when the lowest three groups were compared with the highest three. Confirmation of this hypothesis thus indicated the need to keep the mileage factor constant. In all subsequent analyses, therefore, no-accident, accident-responsible, and accident-not-responsible drivers in the low-mileage group of 12,669 miles and under were compared to those in the high-mileage group of 12,690 to 161,644 miles.

Sex and Accident Status. Sixty-five per cent of the sample of interviewed drivers were men and 35 per cent were women. Comparison by respective accident status with mileage held constant indicated that fewer women than men had accidents. This difference was significant between the one and five per cent levels for low-mileage drivers and at the six per cent level for high-mileage drivers. Actually, a smaller proportion of women in the high-mileage category had accidents than did men in the low-mileage category.[9]

This significant relationship of sex and accident status led to further tests which revealed a close association between sex and other driver characteristics. This pointed out the need for controlling by sex as well as mileage when comparing drivers by accident status and other factors.[10]

8. Significance of difference between proportions was computed using tables by Vernon Davis, "Tables Showing Significance of Differences Between Percentages and Between Means (for Uncorrelated Data)." Pullman, State College of Washington, Washington Agricultural Experiment Stations Circular 151. (Revised) March, 1954.

   In this report, "significant" is used in the statistical sense to mean a probability of a result occurring by chance less than five times out of 100. (Five per cent level.)

9. The tables for mileage and sex appeared in Jean K. Boek, "Driver Behavior and Accidents," *American Journal of Public Health*, Vol. 47, May, 1957, P. 548. A total of 405 drivers were in the low-mileage group and 405 in the high-mileage group.

10. Table 2 is an example of how analyses were made.

Social Status Characteristics of Drivers and Accidents

The social placing of people in relation to one's self and the process of being placed has an important influence on an individual's behavior. Because of this, measures of social position may be clues of how people behave with respect to a specific situation such as driving. Five characteristics of drivers which may be called social status measures because they can be used together or singly in judging a person's position in relation to others are: occupation, house and neighborhood, income, schooling and age.

Occupation. One of the most important indicators of position in American society is occupation—what a person does for a living or his activity during the major part of his waking hours. In this research, two aspects of occupation were considered: employment status and type of occupation for those in the labor force.

Employment status for men meant being employed, unemployed, retired or students, and for women, it meant these plus the category of homemaker. Eighty-six per cent of the men were employed and 14 per cent were unemployed, retired, or students. Thirty-nine per cent of the women were employed while the rest were not in the labor force. No significant association was found between employment status and the accident category in which a person was classified.

Occupations of employed drivers were classified by the three-digit system of the United States Census. According to recent research, the 10 main categories of occupations in this system also constitute an acceptable means of ranking persons by relative prestige from low to high, except for the farm group and a few in other occupations.[11] When drivers' occupational rankings were compared with their accident status, those in higher prestige jobs were neither more nor less likely to have accidents than those having lower prestige work.

House and neighborhood. In addition to occupation, important criteria in establishment, maintenance and judgment of social status are where a person lives, his type of dwelling, how it is furnished and its manner of upkeep. For Schenectady drivers, this was measured by: (1) cataloging and coding addresses according to a residence and area classification map,[12] (2) use of a preconstructed scale on which interviewers checked their judgment of house and neighborhood and (3) interviewer's overall general judgment of family, house and furnishings. Housing on the map ranged from the best in Class I to the slums in Class V. Commercial and institutional areas were also mapped. Thirty-five per cent of the drivers lived in Class III, or average type residences, 27 per cent resided in areas of better housing, 23 per cent were in Class IV, 5 per cent had dwellings in Class V areas, 6 per cent were in commercial districts and 2 per cent in primarily institutional sites. Drivers in one type of housing area were no more likely to have accidents than those in another type. Similarly, neither scale evaluations nor interviewers' judgments furnished ratings that were related to accident status.

Income. The money a person has is considered an important yardstick of his worth, power or prestige in our country. One gauge of money—family incomes for 1954 (the year prior to interview)—was used as a standard for comparing drivers. Near the end of the interview, each driver was handed a card on which was typed thousand-dollar ranges of income, prefaced by a letter; ex. A, $0 through $999; B, $1,000 through $1,999; and so on through Q, $16,000 through $16,999. The driver was then asked to name the letter of the range in which his 1954 family income was located.

Tabulation of income by accident status indicated that significantly fewer high-mileage men with family incomes from $8,000 through $9,999 had accidents than men with incomes from $2,000 through $7,999. Low-mileage men in the $0-2,999 range were less likely to have accidents than those in the $2,000-5,999 range. The common thread between the two findings is that a significantly higher proportion of all men with total family earnings in the middle range of $2,000-5,999 had accidents than did low-mileage, low-income ($0-2,999) men and high-mileage, higher income ($8,000-9,999) men.

Schooling. Schooling of men and women drivers differed significantly, with a higher proportion of the women having training beyond high school. Among all drivers, 12 per cent had college or graduate degrees, while another 13 per cent had one to three years of college or technical training beyond high school. Viewed against the national average of about six per cent being college graduates, it can be seen that the schooling of these drivers is greater.

No consistent relationship was found between schooling and accident status, but significantly fewer low-mileage men with college or graduate training were in the accident-responsible or not-responsible categories than were low-mileage men having eleven grades or less.

Age. A person's age is another fundamental index of his status and thereby of his observed or expected behavior. The behavior of a person behind the wheel may be no exception to this, since it is common to hear someone say that younger or older drivers are worse than others. When this statement was tested, low-mileage women in their sixties were found to have more accidents than women between 20 through 39, and high-mileage men in their sixties were found to have fewer accidents than men between 40 through 49.[13] Drivers of other ages did not differ significantly in the accidents they had.

Marital Status

Marital status was considered because, in many respects, presence or absence of a spouse and family play a part in determining what a person does in his ordinary life. Significantly more men drivers were married (74 per cent) than were women drivers (66 per cent), with the overall average being 72 per cent. Thirteen per cent of the men and 18 per cent of the women were single; 9 per cent of the men and 5 per cent of the women were married

11. Walter E. Boek, Edwin D. Lawson, Alfred Yankauer, and Marvin B. Sussman. *Social Class, Maternal Health and Child Care.* Albany, N. Y. New York State Dept. of Health. 1957.

12. Research on which this map was based had been done by Dr. Marvin B. Sussman, Associate Professor of Sociology of Western Reserve University, while he was Chairman of the Department of Sociology of Union College in Schenectady.

13. This table appeared in Jean K. Boek. "Driver Behavior and Accidents." *Op. Cit.* P. 550.

but had been widowed, separated, or divorced in the past; while 3 per cent of the men and 11 per cent of the women were widowed, separated, or divorced at time of interview. High-mileage women who were married had fewer accidents than high-mileage women who were single. Other differences between the various groups were not significant.

Health

The occasional accident which involves a driver with some physical or mental disability oftentimes arouses such concern on the part of the press and enforcement officials that a frequent outcome has been to prohibit or restrict the driving of all persons with similar ailments. Usually these measures arise from the excitement following one or more of these incidents rather than from a systematic comparison of the accident records of afflicted and non-afflicted drivers.

In an effort to throw some light on the subject, drivers in this study were asked if they had any of a list of eight physical ailments. If they answered in the affirmative for any of them, they were asked whether or not that condition interfered with their driving. A later query concerned other chronic conditions, long drawn-out illnesses or trouble with hearing. A distribution from highest to lowest prevalence of the ailments was made in Table 2, along with number and per cent of replies about interference with driving. Few drivers had any of the conditions, and of those who did, very few said it interfered with driving.

These data reveal how infrequently these disabilities can be expected to appear in a normal community population of drivers. The low frequency also prevented meaningful comparisons of the afflicted and non-afflicted with respect to accident status. These results further indicate the importance of studying the relation of physical conditions to accident experience with a stratified sample that would permit an adequate number of drivers with each ailment to be compared with the rest of the population.

Weight. Eight per cent of all drivers were underweight, 64 per cent were normal, and 28 per cent were overweight. Significantly more men (36 per cent) than women (16 per cent) were overweight.[14] No significant relationships were found between these categories of body weight and accident experience.

Wearing glasses. It was believed desirable to learn more about the possible connection between wearing glasses and having accidents because of flaws penalizing drivers who should have glasses but who do not wear them. It was found that 36 per cent of all drivers wore glasses, 44 per cent did not, 14 per cent did for close work but not for driving, and 6 per cent gave other replies. Significantly fewer men than women wore glasses. This is congruent with the idea that part of the male role in our society includes as little use as possible of aids for sight, hearing or general health. No significant association between wearing glasses and accident status was found.

Wearing sunglasses. Sun glare has been considered enough of an automobile hazard that car manufacturers have offered tinted auto windows, and many car owners have been willing to pay extra cost for this feature. A more common and economical protection from glare has been to wear sunglasses while driving. In Schenectady, 42 per cent of all drivers usually wore sunglasses, 44 per cent did not and 13 per cent did sometimes. Significantly

14. For classifying drivers into weight groups, use was made of the "Nomograph for Determining Per Cent Above or Below Ideal Weight." Washington D. C. United States Public Health Service. More than 10 per cent above the stated normal weight for height of the person put him into the overweight class; more than 10 per cent under, in the underweight class.

Table 2

Drivers Interviewed in Schenectady

Distribution of all drivers by whether or not they had different health conditions and if the presence of any condition interfered with driving.

Health condition (in order of prevalence)	Replies											
	Do not have it		Have it, but doesn't interfere with driving		Have it, and interferes with driving		Have it, but no information about interference		No Answer		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Chronic condition or long, drawn-out illness	739	91	—[a]	—	—[a]	—	69	8	2	—	810	99.0
Arthritis, rheumatism, neuritis	759	93.7	41	5.1	8	1.0	1	0.1	1	0.1	810	100.0
Hayfever	761	94.0	37	4.6	9	1.1	2	0.2	1	0.1	810	100.0
Hearing trouble	774	95.6	—[b]	—	—[b]	—	35	4.3	1	0.1	810	100.0
Stomach ulcer	790	97.5	15	1.8	—	—	4	0.5	1	0.1	810	99.9
High blood pressure	791	97.6	14	1.7	1	0.1	2	0.2	2	0.2	810	99.8
Limited use of either arm or leg	796	98.3	8	1.0	3	0.4	1	0.1	2	0.2	810	100.0
Asthma	797	98.4	9	1.1	2	0.2	1	0.1	1	0.1	810	99.9
Diabetes	803	99.1	6	0.7	—	—	—	—	1	0.1	810	99.9
Fainting spells or epilepsy	806	99.5	—	—	2	0.2	1	0.1	1	0.1	810	99.9

a, b Interference with driving not asked for chronic condition or hearing trouble.

fewer men (37 per cent) than women (52 per cent) wore them. Comparison of these data with accident status showed that low-mileage women who usually wore sunglasses had proportionately more accidents than low-mileage women who did not wear them.

Sleep. As one measure of well-being, respondents were asked whether or not they had trouble getting to sleep at night. Significantly more of the men (92 per cent) than of the women (82 per cent) had no trouble, with the average being 89 per cent for the group. Many of the remaining 11 per cent said it happened "sometimes." No significant relationships were observed between answers to this question and accident experience.

Smoking

Two habits tied in closely with how a person feels and what he does are smoking and drinking. These habits have also become symbolic of adulthood and worldly knowledge. Smoking, particularly, for many is part of work life and personal desire to keep going in spite of fatigue, hunger, or other factors. It was found that significantly more of the men (75 per cent) than women (48 per cent) smoked, with the average for all drivers being 66 per cent. Comparison with accident status showed that among low-mileage women drivers, smokers tended to have more accidents than nonsmokers.[15]

Amount of smoking. More tobacco was consumed by men than by women. Nine per cent of the men and 2 per cent of the women smoked more than one pack to three or more packs a day; significantly more men (36 per cent) than women (16 per cent) smoked a pack of cigarettes daily and significantly fewer men (15 per cent) than women (26 per cent) smoked less than one pack a day. Four per cent of the men smoked cigars, another 4 per cent smoked pipes, and the rest of the men and women did not smoke. No significant differences were found among accident-responsible, not-responsible and no-accident drivers in the amount of smoking done.

Smoking while driving. Fifty-two per cent of all drivers smoked usually or occasionally while driving. Among smokers, 81 per cent smoked at the wheel. Ninety per cent of the men smokers and 56 per cent of the women smokers used tobacco as they drove. This is a highly significant difference. These findings suggest that driving does not represent such a complete change of activity that all other behavior patterns are dropped.

Comparison of the accident status of those who smoked while driving with those who did not revealed no significant differences.

Drinking

One-third of all drivers did not drink, as indicated in Table 3, but almost four out of every 10 drivers at some time or another drove after drinking. If only the 532 drinkers are considered, 58 per cent of them drove after imbibing, whereas 42 per cent did not.

Comparison of drinking and accident status in Table 3 showed that high-mileage men who drove occasionally after drinking were more likely to have accidents than those who did not operate a car after having a drink. Another result, significant between the 5 and 10 per cent levels, was that high-mileage men who did not imbibe, had a greater tendency to have accidents than those who did not drive after drinking.

15. The table on smoking appeared in Jean K. Bock, "Driver Behavior and Accidents," *Op. cit.* Page 550.

Table 3

Drivers Interviewed in Schenectady

Comparison of driving after drinking and accident status with mileage and sex held constant.

Drinking and driving	Low Mileage																High Mileage																GRAND TOTAL	
	Men								Women								Men								Women									
	NA[a]		ANR[a]		AR[a]		TOTAL		NA		ANR		AR		TOTAL		NA		ANR		AR		TOTAL		NA		ANR		AR		TOTAL			
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Does not drink	43	81	3	6	7	13	53	100	89	92	3	3	5	5	97	100	76	78[d]	7	7	15	15	98	100	19	90	1	5	1	5	21	100	269	34
Does not drive after drinking	48	89	2	4	4	7	54	100	72	92	-	-	6	8	78	100	54	88[c-d]	3	5	4	7	61	100	10	100	-	-	-	-	10	100	203	25
Drives after drinking occasionally	21	84	1	4	3	12	25	100	15	100	-	-	-	-	15	100	44	74[c]	5	9	10	17	59	100	5	62	2	25	1	13	8	100	107	13
Drives after drinking	36	82	1	2	7	16	44	100	33	94	1	3	1	3	35	100	103	81	8	6	16	13	127	100	15	94	-	-	1	6	16	100	222	28
Total	148	84	7	4	21	12	176	100	209	93	4	2	12	5	225	100	277	80	23	7	45	13	345	100	49	88	3	6	3	6	55	100	801[b]	100

a. NA means no accident; ANR means accident involved but not responsible; and AR means accident involved and responsible.
b. Information was lacking on nine drivers.
c-c. Difference is significant ($P < .05$ and $> .01$)
d-d. Difference is significant only between the five and ten per cent levels. ($P > .05$ and $< .10$)

Table 4. Drivers Interviewed in Schenectady. Comparison of men and women by who taught them to drive.

Driving instructor	Men No.	Men Per Cent	Women No.	Women Per Cent	Total No.	Total Per Cent
Self	195	37.1[a]	10	3.5[a]	205	25.3
Relative	74	14.1[b]	95	33.5[b]	169	20.9
Spouse[c]	6	1.1	41	14.4	47	5.8
Friend	113	21.5	40	14.1	153	18.9
Parent	85	16.2	37	13.0	122	15.1
Two or three instructors	17	3.2	25	8.8	42	5.2
Commercial school	7	1.3	21	7.4	28	3.5
High school	6	1.1	7	2.5	13	1.6
Auto salesman or mechanic	8	1.5	3	1.1	11	1.4
All other responses	15	2.9	5	1.8	20	2.5
Total	526	100.0	284	100.1	810	100.2

a—a Difference between these percentages is significant ($.05 > P > .01$.)
b—b Difference between these two percentages is highly significant ($P < .01$.)
c The distribution for spouse should be considered together with that for relative, since during some of the first interviewing, husbands and wives were classified as relatives.

Driving Experience

Type of driving instruction. One-fourth of all drivers were self-taught, (see Table 4) with significantly more men than women falling in this category. Comparison of all sources of instruction with accident records showed no significant relationship.

Examination for first license. Approximately seven out of 10 drivers (69 per cent) took the examination for their first license once; 15 per cent took it twice, 3 per cent required three to five times; 12 per cent had never taken a license examination, and 2 per cent gave other responses. There were no significant differences in accident status among the groups.

Length of driving experience. Respondents ranged in experience from less than one year consecutively to 49 years of driving experience. Grouping them by five-year intervals revealed a fairly even spread but with significantly fewer men (6 per cent) than women (31 per cent) having experience of four years or less. In every five-year interval above this, except the 20-24 year bracket, men were represented more than women. Less than one-fifth of the men, compared to over one-half of the women had driven nine or fewer years. Thus, men had considerably more driving experience than did women. It was also found that low-mileage men with 10 through 14 years experience had fewer accidents than those with 15 through 19 years.

Usual speed on the open road where there are no speed control zones. The usual speed of 28 per cent of all drivers was found to be 47.4 m.p.h. or less, with significantly fewer men (23 per cent) than women (37 per cent) naming these speeds. Forty-two per cent of all drivers drove from 47.5-52.4 m.p.h., which approximated New York State speed limits on ordinary highways. Another 28 per cent traveled at 52.5 m.p.h. and over. Thirty-two per cent of the men were in this group compared to 20 per cent of the women, but this difference was significant only between the five and 10 per cent levels.[16] It was found that low-mileage men driving 47.4 m.p.h. or less had fewer accidents than those driving from 47.5 to 52.4 m.p.h. as their usual speed.

Fastest ever driven. As another measure of driving experience, respondents were asked to name the fastest speed they had ever driven on the open highway. Table 5 shows the mode to be 65-74.5 m.p.h. Women did not attain as high speeds as did the men. Tests of apparent associations of fastest speeds with accidents indicated that high-mileage men in the 85-94.5 m.p.h. category had fewer accidents than those in the 55-64.5 m.p.h. group.

Respondents' Appraisal of Their Own Driving

Respondents were asked to: (1) compare themselves with other drivers in terms of skill, (2) judge the relative ease or difficulty of finding their way on strange roads, and (3) give their opinions of night driving. Those who had no accidents did not differ significantly in their replies from those responsible or not responsible for their accidents.

Opinion of Other Drivers and Travel Conditions

Courtesy of other drivers. About an equal proportion of respondents thought that other drivers were very courteous or that most drivers were courteous (22 per cent); that the average driver was courteous (24 per cent); or that some were courteous while others were not (24 per cent). Fourteen per cent considered the average driver to be discourteous, 6 per cent said that most were discourteous, 1 per cent regarded truck drivers as the most courteous and the remainder gave other replies. No significant relationships were found between these opinions and accident status.

Warning signs. Data regarding road signs were obtained through a series of four questions. The first was: "Along the highways, there are usually warning signs pointing out special conditions, dangers or places calling for caution. Do you think that most people notice these signs as they are driving?" In replying, 63 per cent said, "Yes," with significantly fewer of these being men (59 per cent) than women (69 per cent). Twenty-one per cent of all drivers thought that most people did not notice the signs, but if they did, they did not obey them; 8 per cent said it depended on circumstances and the remainder did not know or gave no response. No significant association was found between the answers given and respondents' having or not having accidents.

Observance of stop signs. The question, "Do you believe stop signs are generally observed?" evoked the reply from 77 per cent of the drivers that they usually were. Fourteen per cent thought they generally were not observed. The rest gave other opinions. No significant differences were found in accident status among drivers giving the various answers.

16. The West Sand Lake pilot study found the same percentage of drivers in the different speed groups both by actual measure and by interviewing drivers. Speed limit on the New York State Thruway is 60 m.p.h.

Table 5. Drivers Interviewed in Schenectady. Comparison of fastest they had ever driven on the open highway and accident status with mileage and sex held constant.

Fastest speed in miles per hour	Low Mileage																High Mileage																GRAND TOTAL	
	Men								Women								Men								Women									
	NA		ANR		AR		TOTAL		NA		ANR		AR		TOTAL		NA		ANR		AR		TOTAL		NA		ANR		AR		TOTAL			
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
35-44.9	7	100	-	-	-	-	7	100	18	90	-	-	2	10	20	100	3	100	-	-	-	-	3	100	1	100	-	-	-	-	1	100	31	3.8
45-54.9	23	88	1	4	2	8	26	100	43	86	2	4	5	10	50	100	17	81	1	5	3	14	21	100	7	100	-	-	-	-	7	100	104	12.8
55-64.9	24	73	2	6	7	21	33	100	66	96	-	-	3	4	69	100	39	71[a]	4	7	12	22	55	100	11	92	1	8	-	-	12	100	169	20.9
65-74.9	48	86	3	5	5	9	56	100	53	95	1	2	2	4	56	101	72	80	5	6	13	14	90	100	17	90	-	-	2	10	19	100	221	27.3
75-84.9	21	91	-	-	2	9	23	100	17	94	1	6	-	-	18	100	54	78	7	10	8	12	69	100	8	100	-	-	-	-	8	100	118	14.6
85-94.9	9	82	1	9	1	9	11	100	8	100	-	-	-	-	8	100	46	92[a]	2	5	2	4	50	101	3	100	-	-	-	-	3	100	72	8.9
95-104.9	8	80	-	-	2	20	10	100	1	100	-	-	-	-	1	100	30	81	2	5	5	14	37	100	2	50	1	25	1	25	4	100	52	6.4
105 and over	5	71	-	-	2	29	7	100	-	-	-	-	-	-	-	-	14	88	1	6	1	6	16	100	1	100	-	-	-	-	1	100	24	3.0
Other replies or no response	4	100	-	-	-	-	4	100	6	100	-	-	-	-	6	100	5	62	1	12	2	25	8	99	-	-	1	100	-	-	1	100	19	2.3
Total	149	84	7	4	21	12	177	100	212	93	4	2	12	5	228	100	280	80	25	7	46	13	349	100	50	89	3	5	3	5	56	99	810	100.0

a—a Difference between these percentages is highly significant ($P < .01$).

Necessity for stopping at a stop sign. To reflect as closely as possible what respondents themselves did, they were asked, "Do you believe that it is necessary for drivers to come to a full stop at a corner stop sign they know when no one is in sight?" Sixty-nine per cent said, "Yes," with significantly fewer men (66 per cent) than women (74 per cent) answering in this manner. Another 3 per cent emphatically thought so; 1 per cent did not consider it necessary, but they thought that the driver should stop. Twenty per cent replied, "No," while the remainder had other opinions. With respect to their accident records no relationships of significance were found among drivers holding diverse viewpoints. A sample of their range of answers were these:

"It's cheaper to stop than to pay a fine." "People should live up to the letter of the law." "What's the sense of it if you can see?" "I don't myself, but legally you should stop."

Size of route signs. The fourth question about signs was, "In your opinion are route signs too small, about right, or too large?" Seventy-one per cent considered them right, 21 per cent as too small, and 7 per cent gave other criticism. Less than 1 per cent regarded them as too large. Persons having different opinions did not have significantly different accident records. Some of the criticisms of signs were poor placement (too low, too far from the road, wrong location) too few or too many at some places, too narrow, and poorly painted.

Self Appraisal of Driving

Enjoyment of driving. Four-fifths of the drivers enjoyed driving, with significantly fewer men (76 per cent) than women (88 per cent) feeling this way. Fifteen per cent did not enjoy driving and 5 per cent felt that it depended on circumstances. There was no association between these replies and accident status. Among the many comments to this question, a few representative ones are these:

"I love to drive. The novelty never wears off."

"A certain amount of it."

"I drive because I have to. Driving is a means to an end."

"After you drive for years, it gets monotonous."

"I don't care for driving at all. I never did."

Driving when disturbed and when angry. The two questions, "When you are disturbed about something with other people, does it relax you to drive?" and "Can you tell me how your driving is affected when you are angry?" resulted in many lengthy replies, but no set of opinions was found to be significantly related to accident status.

Driving when sad. Fewer people experienced being sad or depressed than angry while at the wheel. An examination of accident status showed that high-mileage men who drove slower when sad or depressed had fewer accidents than those who were seldom or never sad. High-mileage women who drove slowly under these circumstances had more accidents than high-mileage women reporting little or no change in their driving.

Sleepiness at the wheel. Drowsiness while driving is considered such an important antecedent to accidents that it was felt desirable to learn how these drivers overcame this hazard. The rich variety of replies given reflected familiarity with the problem and produced occasional notes of desperation. In tabulating the responses, a continuum was made of the types of action taken to ward off sleepiness, ranging from minor to major behavioral changes. Since many took several types of action, these were classified by the first mentioned, on the assumption it was the most important to the individual. As shown in Table 6, significantly more women than men had never been or usually were not sleepy at the wheel. Comparison with accident status indicated that high-mileage men who stopped driving altogether or who did not drive while sleepy had fewer accidents than those who said they were never sleepy or were usually not sleepy at the wheel.

Table 6. Drivers Interviewed in Schenectady. Comparison of what they do when sleepy at the wheel and accident status with mileage and sex held constant.

	Low Mileage																High Mileage																
	Men								Women								Men								Women								GRAND TOTAL	
Action	NA		ANR		AR		TOTAL		NA		ANR		AR		TOTAL		NA		ANR		AR		TOTAL		NA		ANR		AR		TOTAL			
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%
Change behavior while driving	24	80	1	3	5	17	30	100	19	90	-	-	2	10	21	100	50	81	4	6	8	13	62	100	7	78	2	22	-	-	9	100	122	15
Stop car only	15	83	-	-	3	17	18	100	4	80	-	-	1	20	5	100	30	73	4	10	7	17	41	100	-	-	-	-	-	-	-	-	64	8
Stop for refreshment	17	89	-	-	2	10	19	99	9	90	1	10	-	-	10	100	34	74	4	9	8	17	46	100	3	100	-	-	-	-	3	100	78	10
Stop to sleep	8	89	-	-	1	11	9	100	3	100	-	-	-	-	3	100	23	79	-	-	6	21	29	100	2	50	1	25	1	25	4	100	45	6
Stop driving altogether, don't drive	12	71	2	12	3	18	17	101	18	95	1	5	-	-	19	100	44	94[a]	-	-	3	6	47	100	11	100	-	-	-	-	11	100	94	12
Other action or no response	4	67	-	-	2	33	6	100	9	100	-	-	-	-	9	100	11	92	1	8	-	-	12	100	-	-	-	-	-	-	-	-	27	3
Never have been or usually not sleepy	69	88	4	5	5	6	78	99	150	93	2	1	9	6	161	100	88	79[a]	10	8	14	12	112	99	27	93	-	-	2	7	29	100	380	47
TOTAL	149	84	7	4	21	12	177	100	212	93	4	2	12	5	228	100	280	80	25	7	46	13	349	100	50	89	3	5	3	5	56	99	810	101

a $.01 < P < .05$, difference is significant.

Phase II — Observation of a Sample of Drivers

Method

In this phase of the research, a sample of persons actively operating their cars in Schenectady was followed in another car by a pair of observers who recorded how the cars were driven, the license numbers of the vehicles and other pertinent data. This was done in order to test the null hypothesis that the way a person drives is not related to his accident record.

Sample selection. Observed drivers represented all persons actively operating passenger cars from Monday through Friday between 7 a.m. and 11 p.m., December, 1955, through February, 1956, and having Schenectady or nearby area license plates.

Steps in the selection of drivers were these: (1) All city intersections were consecutively numbered prior to selecting a sample with a table of random numbers. (2) The number of cars to be observed from each intersection was calculated using the changing hourly volume count obtained from a permanent traffic recorder located on the main east-west street of the business district.

During December, seven observations were made at each sampled intersection. Two of these were done between 7 a.m. and noon, three between noon and 6 p.m., and two between 6 p.m. and 11 p.m. During January and February, eight were made at each intersection: one between 7-9 a.m., three between 9 a.m. and 3 p.m., two between 3-6 p.m., one between 6-8 p.m., and one between 8-11 p.m. (3) By means of alternate choices, half the cars passing through each intersection were observed as they went toward the business district (inbound), whereas half were followed as they went towards the periphery of the city (outbound). (4) Three cars had to go by an intersection in one direction before the third car was followed. Commercial vehicles, station wagons, and cars with license plates issued outside of the general Schenectady area were not counted as they passed. (5) Drivers were observed for a minimum of one mile and a maximum of two miles. When they parked or were lost in traffic before the minimum was reached, their observation sheet was discarded.

Observation scale. Check-marks were made in the places that described the actions of observed drivers on the Observation Sheet shown in Figure 1. Multiple checks were made for actions that were duplicated, and no checks were present for situations in which the driver was not observed.

Scoring the scale. Because pretests showed that each driver could not be expected to be observed on all nine points of the scale, scoring was done by taking into account the ratio of checks on the safe side of a particular item to those on the unsafe side. As indicated in Figure 2, a score of 1 meant the driver was observed three or more different times to have made unsafe actions with regard to, for example, traffic signals. Scores of 1, 2, and 3 meant the checks were more numerous on the unsafe side of a certain item, 4 was a balance of one unsafe mark to one safe mark, while 5, 6 and 7 meant the driver was more safe than unsafe for a certain type of action.

Accident records. The final procedure was to identify the driver by sending the license number of the car to the New York State Bureau of Motor Vehicles and comparing their description of the owner with data on the observation sheet. Where these tallied, the driver's record was then searched for accidents. Where the description differed, phone calls and some visits were made to the owner's home to learn the name of the person driving the car that day. This person's record was then searched for accidents by the BMV.

Figure 1

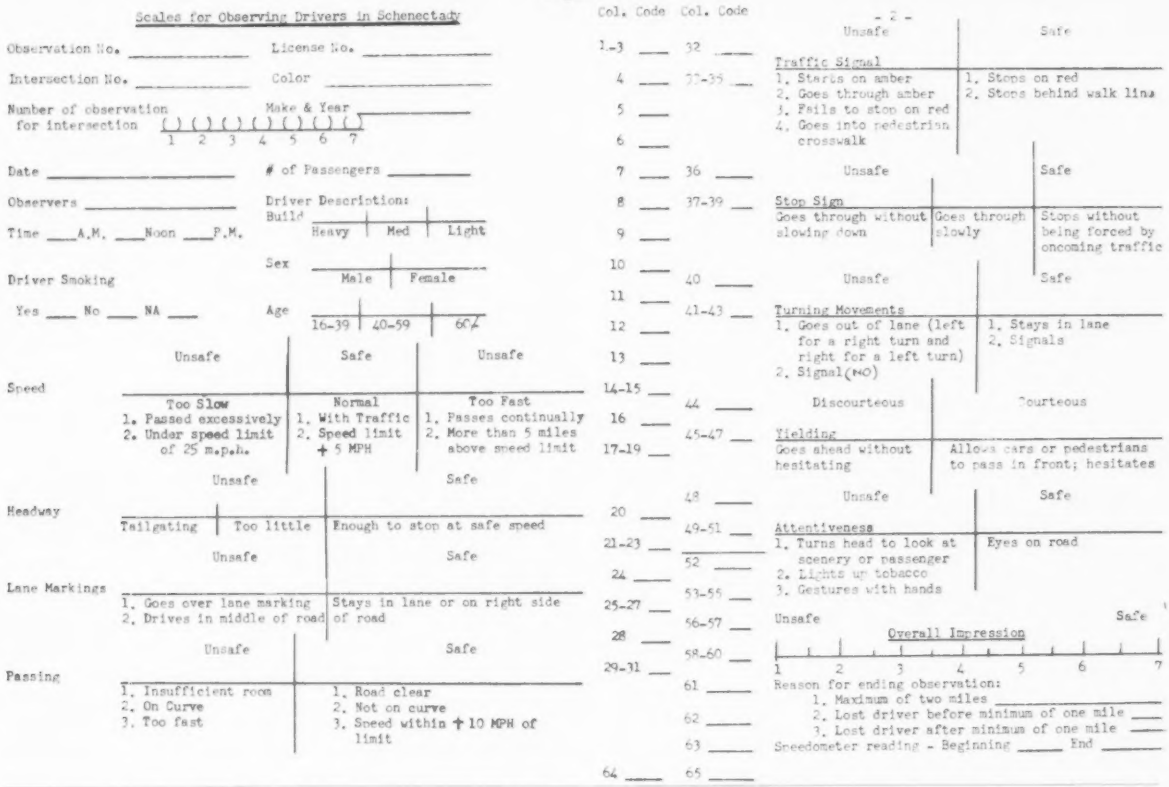

Figure 2. Scoring Method for Each Driver Observation Scale

Description of the ratio used for each of the nine factors	Assigned numerical score
No observations made	0
Three or more unsafe observations and no safe observations	1
One or two unsafe observations and no safe observations	2
A ratio of more than one unsafe observation to one safe observation	3
A ratio of one unsafe observation to one safe observation	4
A ratio of more than one safe observation to one unsafe observation	5
One or two safe observations and no unsafe observations	6
Three or more safe observations and no unsafe observations	7

Results of Phase II

From December, 1955, through February, 1956, 548 drivers were observed, of whom 53 per cent were inbound and 47 per cent were outbound. A tally of completion rate of observations during 18 days of February revealed that of 525 selected cars, 336 (64 per cent) were followed for more than a mile, whereas 189 (36 per cent) were lost before the one-mile minimum. All drivers were not observed on each scale. The proportions of the 548 drivers observed on each scale were: Speed, 99 per cent; Lane markings, 99 per cent; Attentiveness, 98 per cent; Turning, 91 per cent; Headway, 81 per cent; Traffic signals, 74 per cent; Stop signs, 56 per cent; Yielding, 37 per cent; and Passing, 14 per cent.

Characteristics of Accident and Non-Accident Drivers

Ninety-three drivers had one accident, 18 had two, and three had three, making a total of 114 or 21 per cent of observed drivers who had accidents. Seventy-eight per cent of observed drivers were men and 22 per cent women, compared to 65 per cent men and 35 per cent women of the interviewed drivers. Although the men among observed drivers tended to have more accidents than the women did, (23 per cent compared to 15 per cent) the difference was not significant.

Age. There was no tendency for drivers within any age decade to have more accidents than those within any other. A slight tendency was observed for a higher percentage of drivers under 40 years of age to be involved in single car accidents rather than other types.

Body build. Partly as identification and partly to test the null hypothesis of no association between body build and accident involvement, observed drivers were classified as heavy, medium or light with the percentages being 9, 84, and 7, respectively. Although 21 per cent of the

medium weight drivers had accidents compared with 18 per cent of heavy and light drivers put together, the difference was too small to be significant.

Smoking. Fifteen per cent of all drivers were smoking while they were observed, with significantly more men (17 per cent) than women (6 per cent) doing this. There were no differences in accident involvement between smokers and nonsmokers in this sample.

Passengers. Table 7 shows that over half the observed drivers were alone in their cars, while over a fourth had one passenger. A higher proportion of those not involved in accidents than of those who were involved had one passenger. This difference was not significant.

Table 7. Drivers observed in Schenectady compared by number of persons in the cars and by whether or not the driver had been involved in an accident.

Number of persons	Driver not involved in accident		Driver involved in accident		Total	
	No.	Per Cent	No.	Per Cent	No.	Per Cent
Driver alone	231	53.2	69	60.5	300	54.7
Driver and 1 passenger	134	30.9	23	20.2	157	28.6
Driver and 2 passengers	37	8.5	12	10.5	49	8.9
Driver and 3 passengers	15	3.5	1	-	16	2.9
Driver and 4 passengers	4	.9	2	-	6	1.1
Driver and 5 passengers	2	.5	-	-	2	.4
Number not recorded	11	1.6	7	9.6	18	3.3
Total	434	99.1	114	100.8	548	99.9

Safe and Unsafe Drivers Compared by Accident Involvement

In addition to a few safe-unsafe driving characteristics, accident and non-accident drivers were compared by their scores on each of the nine scales of the observation sheet. As indicated in Table 8, these comparisons were controlled by sex, since women were found to drive more safely than men on all factors except lane markings. Women were particularly safer than men with respect to courtesy, headway, and traffic signals.

Scores for speed in Table 8 went from the unsafe 1 to the safe 7. Numbers of men and women having each of the seven scores were given in columns (b) and (d), with the total group being in (f). In Column (c) was given the percentage of men in each scoring group who were involved in accidents. This was done for women in (e) and for the whole group in (g). For example, 181 men scored very safe (7) with respect to speed, and of this 181, 24 per cent had had accidents. The majority of drivers scored on the safe side of the continuum in their speed. Differences in percentages having accidents among those having scores from 1 to 7 were not significant. Similarly, for the remaining eight scales, scoring from unsafe to safe was not significantly related to accident involvement.

Table 8. Drivers observed in Schenectady. Men and women compared by scale of safe- unsafe speed and by whether or not they were involved in an accident.

Scores (a)	Men		Women		Total	
	No. of drivers (b)	Per Cent having accidents (c)	No. of drivers (d)	Per Cent having accidents (e)	No. of drivers (f)	Per Cent having accidents (g)
Unsafe						
1	7	14	—	—	7	14
2	11	18	4	25	15	20
3	23	26	7	43	30	30
4	39	26	5	—	44	23
5	97	21	28	18	125	20
6	67	19	19	16	86	19
7	181	24	58	10	239	21
Safe						
Total[1]	425	23	121	15	546	21

[1]Two drivers were not observed on the scale for speed.

Average score on all scales. A single score for each driver was computed by adding his scores from all scales on which he was observed and dividing by the number of scales on which he was rated. No driver was rated entirely unsafe (scores 1 and 2), whereas 48 per cent were judged entirely safe (scores 6 and 7). Forty-one per cent had an average score of 5, 9 per cent averaged 4, and 1 per cent scored 3. Comparison of average scores with accident involvement revealed no significant tendency among persons demonstrating different degrees of safeness or unsafeness to have accidents.

Conclusion of the Research

This was the first major study in which drivers from a total community population were interviewed and observed. It demonstrated the feasibility of securing characteristics of drivers through intensive interviewing as well as through observation of their actual driving, and relating these data to their accident history. From the data it was possible to test many current ideas about possible factors associated with accidents and, as a result of these tests, to point out the avenues of knowledge that could be fruitfully explored in future research. It also brought out that drivers would tell about their accidents and that such information was necessary in addition to state bureau of motor vehicle records to obtain a complete account of accident involvement.

Of particular importance were the two findings that sex and the number of miles a person drives are significantly related to accident involvement. The implication for further investigation of accident causation is that sex and mileage must be controlled in order to assure the validity of findings about accidents and factors related to their occurrence.

OBJECTIVE MEASUREMENT OF DRIVING SKILL

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IF ONE stops to consider road accidents it is of course apparent that the driver, the vehicle, the traffic, the road, the light and the weather, are all possible factors in any one accident and in practice perhaps ought never to be considered except in their combination. The method of research into accidents generally, however, is to study one factor in isolation keeping, if possible, all the others constant.

I do not propose, therefore, to discuss the interaction between the road environment and the driver, or even between the driver and the design of his vehicle, a province which properly belongs to human engineering, as the subject has now come to be called. Let us just suppose that we have a driver in some standard vehicle, on some standard stretch of road, in standard conditions of traffic, weather and illumination. Our interest will be the variables in the driver himself which make either for good and safe driving on the one hand or accidents on the other.

These variables, as we call them, may be either permanent characteristics of the man, or temporary states such as intoxication or fatigue. The permanent or innate characteristics are of relevance to the whole field of driver licensing and selection; the temporary states to any legislation regulating hours of driving or penalizing the drunken driver. I think I need hardly stress the practical importance of research into all these aspects of the human factor. And, of course, a great deal of research has been done.

The methods that have been adopted by investigators undertaking this research can be grouped broadly into two. There is the statistical approach which seeks to establish causal relationships by an examination of large numbers of accident records or reports, and the experimental approach which seeks to relate some physiological, psychological or social attribute in the individual to his accident record or some other criterion of driving ability. In the experimental approach some performance test is usually employed to measure those individual attributes thought to be associated with driving skill.

Let me now, very briefly, review the success to date of these two approaches, the statistical and the experimental. Any examination of the literature reveals at once the very great prominence that has been given to the concept of accident proneness. Closer examination reveals how remarkably unfruitful this concept has proved. It is not a difficult matter to identify a group of accident repeaters. It is a very different matter, however to show that these accident repeaters are accident prone, and a great deal of the literature on accident proneness has been based on superficial analysis and dubious statistics.

A mathematical model for the distribution of accidents by pure chance, will show that in a group of 500 people having 300 accidents, 12 per cent of the group could be expected to contribute 44 per cent of the accidents. This sort of relationship has not always been appreciated by the investigators. From the vast majority of road accident records as they are compiled at present, it is extremely difficult to sort out the accident experience which should be attributed to personal characteristics of the drivers and that which should be attributed to something specific in the situation in which they regularly drive. For instance, if one man habitually drives in twilight, and another at mid-day, the first is likely to have more accidents without necessarily being more accident prone.

When crude accident rates are related to the results of individual performance scores on various tests that have been devised, it is not surprising that the association should be low. But even when account is taken of varying situations, with time at risk and mileage driven also held constant, and when groups have been identified with greater accident experience than could be expected by chance, the relationship of accident experience to these individual performance tests has still been very slight.

I shall not describe in detail any of these tests or batteries of tests that have been tried out at one time or another in researches on driving ability. It will suffice to say that they have been designed to measure the individual's sensory acuities, his psychomotor abilities, cognitive and intellectual ability, and personal and emotional adjustment. There have also been investigations which related biographical data from case studies to driving records of the individuals concerned. Strangely enough it is only the last that have shown any real promise of detecting the accident prone.

Research has shown a high correlation between accident histories and objective biographical data of social maladjustment. A history of parental disharmony or divorce, excess childhood aggression, truancy from school, change of employment, absence without leave from the forces, credit difficulties, and prosecutions for non-traffic offenses, have been shown to distinguish the high from the low accident frequency driver. It seems curious that these data should provide a more reliable measure of accident proneness than tests of sensory and psychomotor abilities of reaction time, hand and eye co-ordination, manipulative skill, distance judgment and such like, all of which would seem to be more directly associated with the skill of driving. However, as I said earlier, the diagnostic value of such tests has usually proved to be slight. Perhaps

Condensed from a report read at the Fourth Assembly of Delegates of the OTA, held in Stockholm, 1957.
Road Safety in India, Oct.-Dec., 1957, Vol. 4, No. 4, pp. 49-54.

one of the reasons for this is that the fundamental assumptions upon which a good deal of laboratory research has been based are questionable. These psychomotor and sensory tests have usually been designed to measure some single attribute or ability in isolation, and it has been assumed that the mere sum of these attributes makes up the whole of skilled performance. That this is not so, has been shown by recent research on the anatomy of skill, particularly by work done under Professor Bartlett at Cambridge. Skilled performance is more than the sum of its parts. In fact the skill lies less in the separate sensory and psychomotor abilities called into use, than in the complex co-ordination and timing with which these separate abilities are employed and the separate aspects of the task fused in a complex whole.

If you want an analogy, I would say that the sensory and psychomotor abilities are like the cards that are dealt one in a hand at bridge. There may be strong cards and weak cards. One cannot, of course, overcome entirely the handicap of weak cards, but one can compensate by one's play. Now the whole role of compensation has tended to be overlooked in laboratory studies of the sensory and psychomotor elements in driving. The investigator's approach has been a fragmentary one. He decides *a priori* that some single function is a component of driving skill and examines it in isolation under controlled conditions on some simple parallel task. An obvious example is that of reaction time. As you know reaction times vary considerably between individuals. Yet in many reported studies of the subject no significant correlation has been demonstrated between reaction time and accident free driving. The reason is perhaps that though we measure difference in reaction time, we know nothing of possible accompanying compensatory variations in the total pattern of performance.

More and more it becomes apparent that if we want to discover the real nature of safe driving we shall have to study driving performance itself and in its entirety, as one complex skill. Support for this argument would seem to come from the figures that relate age to accidents. Accidents decrease with age even apparently when experience is equalled in the groups compared. When our sensory and psychomotor abilities are at their peak we are, it seems, most accident prone. Every now and again I am horrified to read that one or other of my senses, my eyesight, my hearing, my intelligence too, alas, has been failing since I reached the ripe old age of seventeen or eighteen or thereabouts. But somehow or other I still manage to get by on the roads without disaster.

A recent most interesting statistical study of fatigue as a cause of traffic accidents, showed the frequency of accidents in Stockholm to rise between 7 a.m. and 7 p.m. in a way quite unrelated to traffic density. Other statistical studies of this nature have been made without however such clear-cut findings. In studies reported by the National Safety Council of America it was found that drivers often spend excessively long hours at the wheel, but that accidents do not increase proportionally with time at the wheel, but apparently reach maximum after about five to six hours driving. From insurance company data in 1949, 60 per cent of all long haul trucking accidents occurred during the first three hours of driving.

It is evident that the statistical picture alone does not tell us the whole story or point to the remedy. We want to know just how fatigue affects driving and what aspects of performance suffer most. To answer these questions a very large-scale effort has been made, again in the United States, by the Public Health Service, to study the effect of long hours of driving upon several physiological and psychological variables. The subjects were a group of 899 interstate truck drivers and deterioration was found with periods up to and over ten hours driving since a major sleep. There was little change shown in physiological measures, but deterioration was demonstrated in laboratory tests of visual and psychomotor function such as manual steadiness, simple reaction time, speed of tapping, body sway and flicker fusion rate. (The latter is the rate at which a flickering light is perceived as a steady beam.)

To my mind however these researches are open to some objection on the same groups as the laboratory tests for accident proneness. We are left to assume that this deterioration of the psychomotor functions must affect driving. In actual fact the driver's total pattern of performance could be changing in compensation for this deterioration. We must ask whether the driver does not perhaps slow down, taking fewer risks, just because he is tired. It is clear that the statistical analyses and laboratory tests together are still insufficient to give us the complete picture.

This also applies, though perhaps with less effect, to researches upon the influence of alcohol. Various statistical studies of hospitalized accident cases, and control studies of drivers not involved in accident have shown the relationship between blood alcohol and accident frequency. One well controlled study from Canada showed that the likelihood of accident when blood alcohol was about 0.10 per cent was two and a half times greater than when it was at 0.05 per cent, and at 0.15 per cent the likelihood was ten times greater.

On the experimental side, of course, one could not do better than cite the world renowned work on alcohol by Dr. Goldberg. It is to Dr. Goldberg more than any other that we are indebted for precise measurement of the physiological and psychophysical effects of alcohol. He has, moreover, supplemented laboratory tests with tests of actual driving. If I might here however, very humbly, venture one criticism of the results, it is this: the report of the actual driving tests, if I read it right, shows that the main score of performance was the time taken to complete an operation. It seems to me questionable in this context to choose speed as a criterion since reduced speed could reflect an awareness by the individual of his condition and an added caution. Moreover the impairment reported of some 25 to 30 per cent in performance at blood levels between 0.04 and 0.06 was not so much deterioration as a failure to improve along with the control group who had no alcohol. If you look at the results in another way, they could mean that it is as dangerous to drive in a novel situation (an unfamiliar road for instance) as it is to drive with that alcohol blood level.

Most accident records themselves leave much to be desired, but even when we have identified accident rates or groups of accident repeaters where the figures could not be due to chance or specific circumstances, the correlation with the various individual tests that have been devised

remains low. And when we have sought by laboratory tests, even with motor car simulators, to measure the effect of temporary states in the individual, we are still left with large inference to make about real performance on the road. It therefore seems advisable that an attempt should be made to devleop some technique of measuring performance objectively and directly in the actual road situation.

The reason why so few studies are reported in which actual driving has been scored is no doubt because the job of scoring it is so extremely difficult. What score are we to use? Everyone knows vaguely what good or safe driving means, but as soon as you ask them to describe it fifty different opinions are offered at once. Several useful studies have been done on flying to measure fatigue and stress but these have nearly all been confined to instrument flying where absolute criteria in course, height, speed and rate of turn can be laid down, and deviation from them scored as errors. No such criteria, unfortunately, are ready made for us to measure driving on the road, nor is it possible, unless with exceptional care, to keep conditions standard. In spite of these rather awe-inspiring difficulties, the British Medical Research Council, through its Unit of Applied Psychology at Cambridge, is making at least an attempt to tackle the problem. (The last two sentences were slightly modified in order to eliminate an apparent typographical error in the printed text.) The researches so far are little more than pilot studies of technique but the technique itself shows promise, and is of interest.

Work was begun by leaving aside for the moment the question of what is and is not good driving, and concentrated on the problem of recording exactly what does happen in a vehicle as it is being driven along the road. The controls of a vehicle are basically velocity controls. The steering alters velocity in a straight line, the brake and throttle reduce or increase speed, and a gear change, unless engine revs are altered in ratio will do likewise. Now the resulting centrifugal forces in a turn, and decreases or increases of speed, can all be measured ultimately as accelerations. If one takes sample reading of these accelerations say at every 5 yards of the car's travel, and repeats a run over the same stretch of road, an acceleration pattern appears. It was interesting to discover that when several measures are taken of an individual's driving in this way, the acceleration pattern rather (like a finger print) has a characteristic individual stamp.

No great difference is apparent between skilled and unskilled drivers for easy corners except that the skilled man is a little more consistent in his runs. His acceleration curves lie closer together. However, on a difficult corner, a difference is at once apparent. The learner descends to a much slower speed on the corner and his fore-and-aft deceleration-acceleration curves are therefore steep. The skilled driver does not slow down the same extent. Instead he does a fast gear change at higher speed and climbs away up the hill. Going about the corner he imposes far larger centrifugal forces on the car and the lateral acceleration curves therefore are correspondingly greater.

Now these patterns of themselves of course tell us nothing about the relative merits of the two drivers. But is there anything about this type of record which we can use to predict, say, a conventional assessment of driving ability by an instructor or traffic inspector? One interesting thing about these acceleration patterns is the more or less consistent way that an individual repeats his performance. Suppose then that we take the difference between acceleration curves on two successive runs and calculate a measure of inconsistency. Does this correlate in any way with other judgments of the driver's skill.

The relative inconsistency on cornering tests was recorded in respect of thirty drivers, divided into three groups. These three groups were selected by a Police Chief Driving Instructor on the basis of carefully assessed driving ability —ten skilled police patrol-car men, ten skilled ally drivers, and ten below average drivers—who had all however driven for three years at least. The three groups were tested, and retested six weeks later. The differences in the inconsistency scores derived for each group were highly significant statistically, the skilled police drivers showing a steadily higher consistency than the club drivers who, in turn, were steadily more consistent than the unskilled drivers.

Now why should this inconsistency score distinguish the skilled from the unskilled driver when these other psychomotor tests I have described apparently fail to do so? It may be that the skilled police driver shows little inconsistency because he is trained in a standard way but we think the measure goes deeper than this. We think that as learning proceeds, the ineffective random responses, the overshoots and undershoots, the mistimings and misjudgments are gradually eliminated to leave the essential elements of skill. The skilled driver has a repertoire of responses like the polished strokes of a good golfer, and like strokes in golf, when conditions are the same the response is reproduced with faithful consistency. I would not suggest that all consistency is indicative of skill, for obviously bad habits too can be acquired but I do suggest that perhaps all inconsistency may be indicative of lack of skill. The hypothesis at any rate seems well worth examining further. In relation to driving it would be particularly enlightening to follow through a large number of trainees from the start of training to proficiency; also to relate inconsistency scores to the records of the proven accident prone. This will, I hope, in due course be done.

Meanwhile, whether or not inconsistency equates with lack of skill, this method of scoring can be adapted for other researches. In testing the effect of fatigue or alcohol, without deciding upon some arbitrary error score, it is theoretically possible to ascertain the point at which an individual's habitual pattern of driving is affected. Having revealed an effect, we can then examine its nature. The records to which I have already referred, were taken during a pilot experiment designed to investigate the effects of continuous driving. They relate to two stretches out of seventeen selected on a thirty mile course over country roads. The subjects, I should explain here, were unaware of where the course began and finished or at which points a record was being taken. Five consecutive runs were made on successive fine days over a circuit of seventy miles which included the test course. No special steps were taken to avoid traffic, but when traffic or other obstacles happened to be present on a recording stretch the record was discarded. On each run the course was entered at approximately 2 p.m. On the first three runs and the last

the driver was fresh; on the fourth run, sandwiched between the third and fifth, the subject had been driving for six hours continuously before reaching the course. The experimenter, that is myself, was always in the car, operating the recording mechanism from the back seat.

Owing to failure of the photographic recording system we have unfortunately complete records for only two drivers so far, the two subjects mentioned earlier. The results therefore must be very tentative. They are nevertheless interesting as an indication of the usefulness of the technique. The acceleration scores are such that when comparison is made between the subjects the difference between them could not have occurred simply by chance once in a thousand times. A measure of the learning effect I mentioned earlier for the inexperienced driver showed a difference between his first and final runs, which compared with the difference between the third and final run could not have occurred by chance twice in a thousand times. So to this extent the measures are apparently sufficiently sensitive.

When we came to look for an effect from the six hours continuous driving, however, none was apparent. We searched for indications of some break in the co-ordination of responses, for a scatter in the point of braking, for centrifugal forces that might indicate misjudgments or mistiming of controls, and found nothing. The subjects themselves were not aware of any deterioration in their driving, nor could we find from the record any unconscious deterioration in the standards they set themselves such as we would have expected from the results of laboratory studies of skill under stress. It must be remembered that we were recording the subjects' responses to stimuli perceived, in this case the rather obvious stimuli from the shape of the road ahead. It is possible that with the onset of fatigue it is the things not seen that are important, the less obvious or unexpected stimuli not present in our experiment. We have therefore since that time introduced into the experimental car three signal lights, one on the bonnet, simulating the stop light of a car ahead, and two very small lights on the windscreen towards the periphery of the driver's field of vision. These can be operated by the experimenter and the driver's response is to brake immediately. His response time is recorded automatically by an electronic timing and printing device installed in the boot of the car. Quite obviously a great deal more research remains to be done, with an adequate number of subjects and with measures of the driver's vigilance included with the other measures. But we believe we are on the way to developing a workable technique which can give us interesting answers.

I mentioned earlier that we had difficulty with the photographic system of recording accelerometer and other instrument readings. Before we return to full-scale experiments we hope to have developed a further electronic device capable of sampling the output from the accelerometers, recording the point of operation of the foot controls and printing the entire record. This will so simplify the analysis of results that we should be able to test an adequate number of drivers. In the interim, with the signal lights already installed in the experimental car, I have conducted a pilot study of the effects of alcohol.

The tests were carried out under realistic conditions on an army vehicle testing track which, in nearly all respects, was exactly like a continuous loop of highway. The traffic circuit however was always in one direction only. The hazard of other traffic, though present in the driver's mind, was therefore minimized. The test consisted of about an hour's driving, during which, at chosen random points, 18 signals for response were given by one or other of the signal lights. The last six signals repeated the first six both in the choice of light and the point of operation. Any learning taking place either in the condition with alcohol or in the condition without, would have been apparent. I may say here that no learning effect remained in the experiment.

The subjects were twelve police-car drivers and each did two runs, one with alcohol, one without, the order being alternated. The dose given was calculated to produce a blood alcohol level of about 0.08 per cent. Breath tests and urine specimens were taken half-way through the tests and at the end.

Taken as a group, on all lights, the deterioration in performance was statistically significant. When the subjects are considered individually, however, only four show deterioration that might not have occurred by chance according to the accepted levels of significance. As an observer from the back seat I was unable myself to detect any observable difference in the driving of these men or in the beautifully tapered braking stops that training had inculcated in them. At this point the Director of Scotland Yard Forensic Laboratory, with whom I was cooperating, suggested that I should lift the experiment out of the rarified atmosphere in which research was ordinarily conducted. Would I use blood levels of up to 0.20 per cent? The drivers were ready and willing, and on a cleared track we went ahead and I doubled the dose. Two tests were enough. The first subject by the half-way mark was in no position to carry on. He was making tremendous efforts to compensate for the effects of the dose and actually improved his response times over the earlier run with the smaller dose. He reduced his speed to a crawl, but in the effort of concentrating upon the lights, he still wandered all over the road. It was a classical demonstration of the breakup and narrowing of the field of attention. I stopped the experiment when he slumped over the wheel.

The second subject was hardier. He simply drove faster and faster until on the straights he had the car at maximum speed. His tapered braking stops became progressively more violent and erratic, with sideway skids entering in. At the same time he lost insight into his own impaired performance, announced that the car handled beautifully and that he would not dare to drive his own patrol car like this. He wished we had a wet road on which to try out some stops. Finally on suddenly perceiving a signal light, he braked savagely at 75 miles per hour, got into an uncontrolled skid, and we came to rest buried up to the axles in stones and dirt on the side of the track. It was another classical exhibition of the behavior expected with alcohol. But it was enough.

For the future we have decided to be less ambitious in our researches! My big regret of course is that all my other measures, the acceleration scores, were absent from the car, and that this spectacular display of talent should have been lost without trace.

OPERATIONS ANALYSIS OF TRAFFIC SAFETY

A Classification of Traffic Situations

by Fletcher N. Platt

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IN an earlier paper, entitled "Highway Transportation Problems," the author developed a method of relating traffic situations to the major parameters that occur to a driver and his vehicle. Highway and traffic events—driver observations, decisions, errors—near collisions, collisions—injuries and fatalities were related in sequence. (Table I).

TABLE I
The Odds of Traffic Situations

Events	200/mile
Decisions	20/mile
Errors	1/two miles
Near Collisions	1/500 miles
Collisions	1/61,000 miles
Injuries	1/430,000 miles
Fatalities	1/16,000,000 miles

Occurrence of the first four situations were estimates, based on general observations, not on analysis or experiment. Collisions, injuries and fatalities were computed from traffic accident statistics(1).

The following presentation has been developed to define in detail fundamental parameters relating to traffic safety and to classify them for further use. It will be obvious to the reader that this is a comparatively naive approach. Some apparent factors, as well as many of the more subtle ones, have been over-simplified or omitted. However, the framework for a sound, analytical method is presented and it can be the foundation for more sophisticated studies of the traffic safety problem.

The ultimate goal of this method is to develop a means of analyzing the highway, traffic, vehicles and drivers accurately enough to:

1. Suggest new research projects.
2. Determine the relative importance of current and planned programmes.
3. Predict the final result from changes of individual parameters related to traffic accidents.

For example, what is the relative importance of major highway components in respect to accidents? What is the influence of vehicle design characteristics on safety? What factors are most important in driver training? Enforcement? Safety messages? How are they related? If a major highway is changed by installing lane barriers, to what extent is the potential accident hazard reduced?

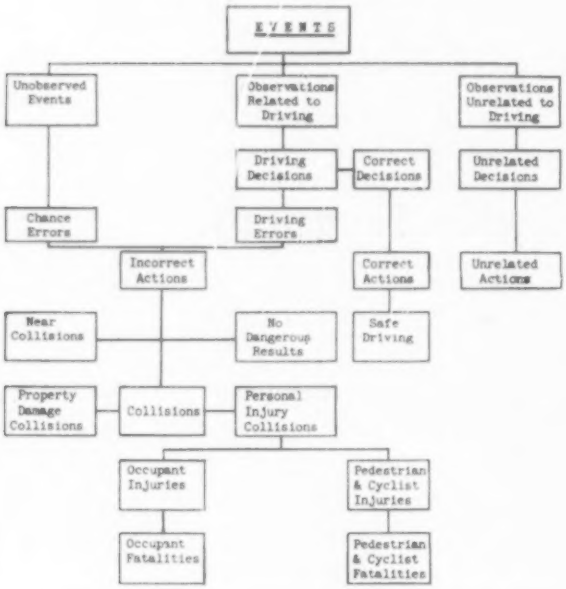
At present, these and many more questions can be answered only by opinion, not by analysis. However, with the application of existing principles of psychology, mathematics, statistics and operations analysis, traffic safety can be predicted and controlled. A yardstick to measure the effect of individual changes in the system is of paramount importance.

Incidentally, this report also emphasizes the enormous dimensions of the problem and should tend to discourage those who believe that traffic safety can be realized by a few simple solutions. The traffic safety problem may be as complex as the guidance system of an ICBM. It is probably as difficult to comprehend as all the logistics problems of World War II combined. And yet, most people are led to believe that they can not only understand these complex factors, but can solve the problems. Actually, it is apparent that many aspects of traffic safety have not, as yet, been classified and inter-relationships are still unknown.

Reprinted from "International Road Safety and Traffic Review," Vol. VI, No. 2, Spring, 1958.

Basic Principles of the Analysis

TABLE II
Basic Order of Traffic Situations



As the motorist drives down the street or highway he sees ahead of him a wide variety of events. These vary from a sign on the shoulder of the road to a car or pedestrian about to move in front of him. These events may or may not be observed by the driver and some of them may not even relate to the driving task. The driver obviously can only make decisions on the events which he observes or anticipates. Most of the time correct decisions are made, but once in a while judgment may be faulty and incorrect decisions result. Some errors also occur by chance because certain events have not been observed. Incorrect driving actions will result from both incorrect decisions and chance errors. Correct actions, on the other hand, lead to safe driving.

The psychologist([2]) classifies these situations as a process of cognition.

—Stimuli (events) are some form of physical energy which activates receptors.

—Receptors or Sensory Processes (observations) are classified in eleven or more sense modals such as vision, audition, etc.

—Perceptions (decisions) derived from sensations, are guides to behaviour.

—Responses (actions) are derived from perceptions.

From the standpoint of safety, the reduction of incorrect actions will, in turn, reduce traffic collisions and resulting casualties. Most incorrect actions are not serious and produce no dangerous results. However, once in a while, a series of events that occur by chance simultaneously, will cause an incorrect action to lead to a near collision or collision.

Collisions are generally classified into two categories; property damage and personal injury. Injuries may occur to either occupants, pedestrians or cyclists. It is obvious that a fatality is a special case of the injury classification.

Traffic Events

Most events, things that occur on the traffic scene, are related in some way to traffic and actions of the driver. Events can be classified in many ways. Table III presents events in five basic groups: road structure, environment, stationary objects, moving objects, inside the vehicle. Each group is divided into continuous or discrete events. Some events occur in both classifications. Continuous events, such as the road surface, create a continuing picture to the observer as contrasted to a discrete object, such as a stop sign.

The difficulty of the driving task and the hazards will vary from road to road and from one time to the next, as the number of events change. For instance, the number of vehicles, the weather conditions, and the number of pedestrians vary greatly from one trip to the next, even on the same section of highway.

TABLE III
Traffic Events
Road Structure

Continuous	Discrete
Width of pavement	Horizontal curves
Curb and shoulder	Vertical curves
Lane markings	Surface hazards
Surface roughness	Traffic signs and signals
	Lane markings
Environment	Intersecting roads
	Guard posts and rails
Sun glare	Obstructions (visual)
Darkness	Sun glare
Rain or snow	Light glare
Fog, haze or smoke	Rain or snow
Wet roads	Fog, haze or smoke
Snow or ice on roads	Wet roads
Sand or gravel on roads	Snow or ice
Wind	Sand or gravel
	Wind
Stationary Objects	Parked vehicles
	Trees
	Abutments
Moving Objects	Signs (advertising)
Vehicles (to be considered later)	Vehicles
	Pedestrians
	Animals
Inside the Vehicle	Bicyclists
Driver	
Passengers	Passengers
Vehicle instruments	
Sounds (Vehicle, Voices, Radio)	Sounds
Control motions and forces	Control motions and forces
Motion and inertial forces	Motion and inertial forces
Temperature and humidity	

Road Structure, Environment and Stationary Objects:

Specific events relating to road structure, environment and stationary objects can be enumerated for any particular section of a roadway, at a given time. Continuous and discrete events must be totalled separately as they are treated differently when determining the number of driver observations.

Moving Vehicles:

The events due to moving vehicles are most important and yet difficult to evaluate. Table IV is a proposed outline for this analysis. Formulas can be developed to determine the number of events that enter into the driving task under known traffic conditions. Although such formulas might not be exact, they can provide a framework to define the inter-relationships of moving traffic characteristics.

Intersection Traffic:

Each driver has a number of choices of action at an intersection. Therefore, the potential events must be considered as well as the actual events. Obviously, there are many types of intersections with different characteristics. Some of the more common types are listed in Table IV.

TABLE IV
Outline of Events in Traffic Due to Moving Vehicles

- Traffic Flow in One Direction Only
  - Velocity Constant
  - Passing other Vehicles
  - Being Passed
- Traffic in Both Directions
  - Passing or Being Passed in Same Direction
  - Oncoming Vehicles, no Passing
  - Passing of Oncoming Vehicles
  - Passing on Three Lane Highway
- Intersections
  - Right Angle Intersections
    - No traffic control
    - Stop signs
    - Signal traffic control
    - Subject vehicle making right turn
    - Subject vehicle making left turn
  - Tee Intersection
  - Driveway
  - Unlimited Access
  - Limited Access

The number of discrete events that are encountered at any intersection will be a function of the number of vehicles entering the intersection and the potential events that might occur. For instance, at right angle intersections, without stop signs or traffic signals, each driver has several choices related to the direction and velocity of his vehicle. Also, each driver can signal other drivers or pedestrians. Theoretically, then, each car represents six potential events as it enters an intersection; (1) go straight (2) turn right (3) turn left (4) constant velocity or acceleration (5) slow down or stop (6) signal.

Events Inside the Vehicle:

Events inside the vehicle are just as important as those that occur outside. They can be divided into two classifications; (1) The Vehicle (2) Driver and Occupants.

Vehicle

The response of vehicle controls can be considered as a series of events that relate to the problem. Some types of response are continuous, such as steering, while others are discrete, such as braking effort or acceleration. The classification in Table V is suitable for evaluation.

TABLE V
Events Inside the Vehicle

- Continuous
  - Speedometer and other gauges
  - Steering "feel"
  - Inertial forces
  - Vibrations
  - Oscillations
  - Engine noise, wind noise, radio
- Discrete
  - Glare and reflections
  - Brake motion and forces
  - Horns
  - Vehicle malfunctions

Driver and Occupants

The driver may or may not be concentrating on the driving task, and so to take this into account, the driver's mental distractions must be considered as a continuous event. Each passenger in the vehicle may also affect the driver's concentration by word or action, and should also be counted individually as continuous events.

In order to obtain the total number of events on a given section of highway, at a particular time, continuous and discrete events must be summated separately. They must also be classified as events related and unrelated to the driving task (Table VI).

TABLE VI
Example of Table for Summary or Events

Continuous Events	Unrelated	Related	Visual	Aural	Tactual	Total
Road Structure ..						
Environment						
Moving Objects .						
Inside Vehicle ..						
Total						

Discrete Events per Mile	Unrelated	Related	Visual	Aural	Tactual	Total
Road Structure ..						
Environment						
Stationary Objects						
Moving Objects .						
Inside Vehicle ..						
Total						

Driver Observations

Human beings have at least 11 senses according to a prominent psychologist* and are shown on Table VII. Ten of these 11 have some bearing on the driving task. Four are important most of the time. Visual, kinesthetic, static and auditory senses are commonly used by the driver in observing his environment.

Usually there are a number of continuous events occurring simultaneously, and the driver's attention is divided among them in proportion to their relative importance to him. It can be assumed that a person's sensory processes are all receiving general stimuli simultaneously. They pick up cues from continuous events and bring certain ones to attention. The driver's mind inspects them, deals with them or discards them. The psychologist calls this process, perception.

Apparently the human being can focus attention on only one thing at a time, but he can oscillate very rapidly between several stimuli.

* A. R. Lauer, Professor of Psychology, Director—Driving Institute, Iowa State College, Ames, Iowa.

TABLE VII
Outline of the Sensory Processes

Sense Modality	Sense Organ	Psychological Phenomena	Relation to Driving Task
Visual	Eye	Light and shade	Most important
Kinesthetic	Muscles	Location of members and movement	Important
Static (Equilibrium)	Semi-Circular Canals	Equilibrium Acceleration and Deceleration	Important
Auditory	Ear	Sound Noise Tone	Important
Olfactory	Nose	Odours	Emergency Situations
Organic	Viscera	Hunger, thirst, fatigue, etc.	Indirectly
Pain	Skin and Viscera Head	Pain and discomfort	Indirectly
Thermal	Skin	Coldness	Occasionally
Thermal	Skin	Warmth	Occasionally
Tactual	Skin	Touch	Occasionally
Gustatory	Tongue	Tastes	None

Nevertheless, experiments have demonstrated that the number of observations that a person can make is limited by time. Therefore, the faster a vehicle is moving, the fewer observations can be made per mile travelled.

From the foregoing discussion, it can be seen that human limits of observations may be very important in the sequence of driving situations. In the earlier section on general principles (Table II), there were three major classes of observations:

1. Observations related to driving
2. Observations unrelated to driving
3. Unobserved events

The larger the number of unrelated observations that a driver perceives, the greater the limitation on observations related to driving. Unobserved events are then the result of these limitations and inattention. For example, in heavy traffic a driver may realize that he is unable to observe all the events that occur in the scene around him. Under such conditions, he has several choices. He can slow down, change position in relation to the environment, or trust that others can observe his actions and compensate for his mistakes.

Consider now the individual sensory processes and their relation to the driving task.

Visual Observations

Vision is the most important sensory process in driving. Visual observations are related to the factors in Table VIII.

The relationship of environment to visual observations is obvious. In rain, fog or snow the driver's vision will be limited to some extent. Normal night driving on unlighted highways will also restrict the number of observable events.

Characteristics of the car affect driver vision and will restrict events that are observed. The two extremes of vehicle design from a vision standpoint might be the visibility in a panel truck compared to a convertible with the top down.

TABLE VIII
Factors Related to Visual Observations

Environment
- Events taking place
- Light conditions
- Weather conditions
- Environmental obstructions to vision

Vehicle
- Vehicle visibility (glass, mirrors, defroster, windshield wipers and washers)
- Vehicle velocity (speed will not only limit time to observe, but objects appear less clearly)

Driver
- Driver's eyesight
- Driver's ability to focus and scan (time)
- Driver's choice of observation (what to look at)

The experience of a driver, his training and his physical condition each contribute to his ability to make visual observations when driving. For example, drivers with limited experience may focus most of their attention on the driving scene ahead with little or no regard for the events taking place to the side or behind them.

Driver vision* can be divided into two categories:
—Detection of motion position and form.
—Direct focus plus peripheral vision.

It can be assumed that the eye can detect motion and form at all times (with visibility permitting) while direct focus is willed by the driver. Preliminary studies indicate that the eye can adjust position and focus on a new object about once a second over an extended period of time and about twice a second for a short duration (10 seconds). If the eyes concentrate on one object for more than a second or two, they take on a fixed stare.

Motion, position and form can be detected continuously in the periphery of vision. From this it is obvious that a driver is physically limited in the number of visual observations that can be made in a certain time, and so the velocity of the vehicle will limit the number of events that can be seen.

Observations by Feel

The driver receives much information about the operation of his vehicle by "feel," (kinesthetic and static senses). The most important of these are:

Steering wheel—motion, forces and rate of change of force.
Inertia forces and rate of change in all three dimensions.
Brake pedal—motion and force.
Vibration, oscillation and stability of the vehicle.

This experience called "feel" seems to be related more to the subconscious habit patterns than to conscious effort required of visual observation. They are the important but subtle observations that improve with experience and practice. These items relate to vehicle design, highway design and dynamics of motion. The brake pedal feel is usually the only discrete function, others are continuous under most conditions.

Observations of feel occur simultaneously with other observations and are not considered conflicting.

* A method of driver training, developed by Harold Smith and John Cummings, applies the techniques of seeing to the driving task.

Observations by Hearing

Sounds related to the driving task are important to the driver. Although usually not as useful in driving as vision and feel, sounds in some instances may be contributing factors in collision prevention. The following sounds are related to driving:

—Wind
—Engine
—Tires
—Horns
—Traffic

Observations by Smell

This sense is only useful to the driver in detecting emergency situations such as:

—An over-heated engine
—Burning brakes
—Exhaust fumes
—Fire

Observations by other Sensory Processes

The other senory processes, listed in Table VII might be considered to have some relationship to the driving task with the possible exception of taste.

Organic and Pain Senses

These senses probably have an important influence on the driver's ability to make decisions. For instance, muscular fatigue or even severe headaches could have a major bearing on the driver's limit of observations.

Thermal and Tactual Senses

These relate to driver comfort and may at times be very important phenomena. They include:

Coldness	Stickiness
Warmth	Tickling
Wetness	Itching
Dryness	

Temperature, humidity, the driver's clothing, the car heater or air conditioner may individually or collectively relate to these sense processes and in turn could affect driver concentration.

Unobserved Events

For various reasons, many events relating to the driver's task are not observed by him. Several examples include:

Vehicle design obstructions
Environmental obstructions
Number of events greater than driver's capacity*
Lack of driver attention
Driver experience

As the driving task becomes more complicated, i.e., the number of events increase, the number of unobserved events will probably increase also. Some of these events may be important while many others have no effect on the driving situation. The odds of an improper action resulting from an unobserved event are probably greater than those caused by errors of judgment.

Driver Decisions

Decisions made by a driver depend on a number of important motivating factors shown on Table IX.

TABLE IX

Classification of Driver Decisions

Observations
- Actual
- Anticipated

Driver Objectives
- Destination of the trip
- Importance of travel time
- Economic factors
- Comfort and convenience

Driver Judgment
- Experience in anticipating events
- Skill handling vehicle
- Physical condition of driver
- Abnormal phychological characteristics of driver
- Mental distractions
- Knowledge of traffic laws
- Expected enforcement and penalty
- Estimated accident potential
- Condition of vehicle
- Trust of other driver's ability
- Environment (all factors)
- Familiarity with route

Timing
- Judgment time
- Anticipated reaction time
- Anticipated vehicle response

Driver decisions are based on actual or anticipated observations and some result from the stimulus of habit rather than reason. Obviously, not all observations require decisions of action.

Driver objectives, as noted in the Table, will have a strong influence on the decisions that are made. These objectives are not always compatible and will vary from trip to trip and may change within a single trip for the same driver. The route selected for the trip and attempted trip speed will depend on all of these objectives.

Judgment with its many factors will affect the individual decisions of the driver. Numerous studies have been made on this phase of the problem and further research will be required to evaluate the inter-relationships of these factors.

A method of evaluating "risk taking" of drivers has been developed([4]) that might be considered as the cumulative effect of many judgment components.

Not only is the driver's judgment important, but his timing must be good. His decisions must be made in time to take proper action. Tests can easily determine reaction time of a driver, but judgment time under emergency conditions is more difficult to obtain and evaluate. Devices such as the Aetna Drivo-Trainer ([5]) and the Tachistoscope([6]) help train drivers in timing as well as judgment. More research is needed in this field to relate training methods to actual needs.

* Human capacities vary greatly from one driver to the next and from time to time with the same driver.

Driver Actions

In the driving task, the driver has certain actions (respones) that are the result of decisions made. These actions are listed in Table X.

TABLE X
Driver Actions

- **Direction**
  - Constant course
  - Turn
  - Change lanes
- **Motion**
  - Constant speed
  - Accelerate
  - Slow down
  - Stop
- **Position**
  - To road
  - To other vehicles
  - To environment
- **Signals**
  - Turn signal
  - Hand signal
  - Horn
  - Lights
- **Actions Unrelated to Driving**
  - Adjusting heater
  - Tuning radio
  - Talking to passengers
  - Smoking
  - Reading map

The driver may perform these actions simultaneously or singularly. These actions can be studied for a sample of drivers and ratings applied to each activity in relation to:

—Safe or unsafe actions
—Congestion or free flow of traffic
—Obedience or violation of the law

The results of these three methods of classification may not always be compatible.

Incorrect Driver Actions

Incorrect actions are the result of incorrect judgment and chance errors and will be considered in relation to safe and unsafe actions only. (Chance errors are some function of the number of unobserved events).

Examples of incorrect actions are listed in Table XI.

TABLE XI
Incorrect Driver Actions

- **Incorrect Direction**
  - Loss of control—(skid or roll)
- **Incorrect Motion**
  - Too slow for traffic conditions
  - Too fast for traffic, environment or driver ability
  - Stopped too rapidly
- **Incorrect position**
  - To road
  - To vehicle
  - To environment
- **Incorrect Signals**
  - Did not signal
  - Signal incorrectly or not understood
  - Signal not seen by others
- **Unrelated Actions**
  - Interferes with driving task

Near Collisions

In a majority of cases, incorrect actions will have no dangerous results. Other drivers usually compensate for an error or other factors may make the action unimportant. However, once in a while, events will occur in certain sequence or time that will cause an incorrect action to create a near collision or even a collision. The frequency of near collisions (requiring a sudden steering, braking or accelerating manoeuvre to prevent impact) is some measure of the number of incorrect actions that are made.

Up to the present time there have been few attempts to measure incorrect actions([7]) or near collisions*([8]). However, an intensive evaluation of these factors would unquestionably lead to a better understanding of the causes of collisions.

Collisions

Vehicle collisions are classified in many different ways, depending on the analysis being made. Examples of several classifications are listed in Table XII.

TABLE XII
Classification of Collisions

- **Object Impacted**
  - Pedestrian
  - Other motor vehicle
  - Railroad train
  - Street car
  - Animal-drawn vehicle
  - Bicycle
  - Animal
  - Fixed object
  - Overturned in roadway
  - Ran off roadway
  - Other non-collision
- **Severity of Accidents**
  - Property Damage Accidents
  - Personal Injury Accidents
  - Fatal Accidents
- **Types of Casualty**
  - Injuries
    - Occupants
    - Pedestrians
    - Cyclists
  - Fatalities
    - Occupants
    - Pedestrians
    - Cyclists

Although the number of fatalities, injuries and collisions are important generally, they are of little value in studying safety progress unless exposure rates are used. In most traffic safety studies, exposure is based on miles traveled, vehicle registration or population, and is usually applied to the sum of all types of traffic accidents. These methods are incorrect and misleading, but they are used because true exposures are not available. Exposure indices should be studied and standardized for different types of accident situations.

For example, exposure to collisions with other vehicles is not the same as exposure to collisions with pedestrians or with fixed objects. Also, exposure to injuries by vehicle occupants is quite different from pedestrian exposure.

The relationships between different types of accidents are not as simple as is generally believed. The severity of property damage accidents is related to the object hit and the stopping distance as well as velocity of impact.

Injuries and Fatalities

The number and severity of injuries and the number of fatalities are not directly related to the extent of property damage. Also, the relationship of fatalities to injuries

* This method was devised sometime after the author's discussion with Dr. T. W. Forbes concerning his study of near collisions. (See Reference 8)

is a function of age of the victim and the medical treatment received as well as severity of the collision. Table XIII lists the factors that relate property damage collisions to injury collisions and also the factors that relate injuries to fatalities*([9])([10]).

TABLE XIII

Factors Relating to Types of Collisions

Property Damage to Injury Collisions

- Direction of impact
- Impact speed
- Object hit (its velocity and mass)
- Stopping distance (decelerating forces)
- Seated position of occupants
- Vehicle Design—General
  - Weight (mass)
  - Type of Body Construction
    - Energy absorbing
    - Non-collapsing
- Vehicle Design—Interior
  - Safety door latches
  - Safety steering wheel
  - Padded instrument panel and visors
  - Recessed knobs
  - Seat belts
- Human tolerance to Decelerating Forces

Injuries to Fatalities

- Types of injuries
- Severity of injuries
- Age of victim
- Physical condition of patient prior to accident
- Human tolerance to forces
- Medical Care
  - Time before treatment begins
  - Type of first-aid treatment
  - Time to get to hospital
  - Emergency treatment (plasma, etc.)
  - Diagnosis
  - Time before surgery
  - Surgical treatment
  - Post-operative care

The medical profession's role in traffic safety is probably far greater than generally realized([11]). It has the responsibility, first of all, for the health of the driver, and for assisting public officials to establish standards of licensing([12]). It is concerned with human tolerance to fatigue, decelerating forces([13]) and the cause of injuries in a collision. Even more directly, however, the doctor and his staff must develop a team to treat accident patients for recovery from injuries. The team effort includes first aid training, ambulance service, medical diagnosis, techniques and treatment. Table XIV charts the major aspects of the problem.

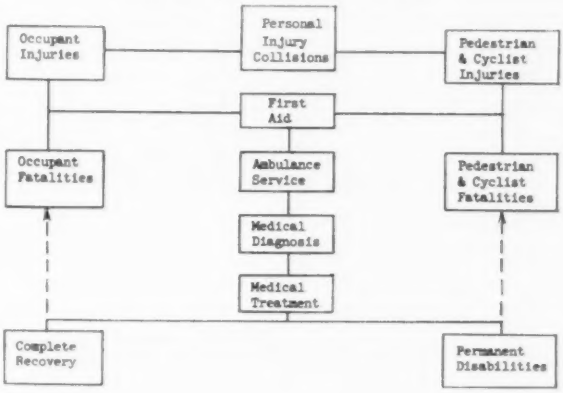
An important part of the reduction in traffic fatality rates probably can be attributed to the improvement in medical techniques over the last two decades. However, this assumption may be difficult to substantiate because of the lack of data.

* In 1955 certain features were introduced in new Ford Motor Company products that reduced the possibility of crash injuries.

Current crash studies of recent model cars by the Cornell University Crash Injury Research Team has shown a major reduction in serious, critical and fatal injuries as a result of these design changes.

TABLE XIV

Medical Aspects of Traffic Accidents



Usual Traffic Safety Classifications

The list of usual traffic safety classifications are shown on Table XV and are related to the traffic situations discussed in this paper. The "x" designates a direct relationship between the two parameters. Situations to the right of any "x" will be affected indirectly. Obviously, some of these relationships can be defined more clearly than others. However, with detailed study, these associations may become more obvious.

TABLE XV

Cross Reference of Traffic Activities

Usual Classifications	Traffic Situations							
	Events	Observations	Decisions	Actions	NC	C	I	F
Highway Engineering	X							
Traffic Engineering	X							
Vehicle Design	X	X				X	X	X
Vehicle Inspection	X	X				X		
Driver Training		X	X	X				
Driver Safety Education		X	X	X				
Enforcement & Traffic Courts	X			X				
Uniform Laws	X		X					
Driver Licensing Laws			X	X				
Medical Profession		X	X				X	X
Accident Reports				X		X		
Crash Injury Research							X	X

X—Indicates that the particular classification has a direct relationship to the traffic situation.
NC—Near Collisions
C—Collisions
I—Injuries
F—Fatalities

This paper can have no formal ending. It is like a dictionary or map. It is a plan for further study. Each segment must be divided and sub-divided, evaluated and re-integrated into the pattern.

Research must continue and be broadened in scope. Mathematical solutions can be found to open the door to understanding—

There is much more to be done.

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PSYCHOLOGICAL FACTORS IN TRAFFIC ACCIDENTS ON FREEWAYS

by T. W. Forbes

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THE subject of psychological factors in traffic accidents is one on which there is all too much mythology and opinion but on which facts can be obtained by adequate research. Unfortunately, human factor research studying man-machine-highway interrelationships has been of too limited scope in the highway safety field, though some has been done for many years. Large scale research of this type in military and industrial man-machine problems has yielded much information. The importance of human factors in safe and efficient operation of highways is now becoming especially critical as we start the building and operation of the freeways of the interstate highway system.

For the engineer in charge of operation of a high speed freeway and for most effective work of enforcement patrols on such highways, a knowledge of the psychological factors contributing to accidents is of first importance. Freeway design specifications will insure the most efficient highway from a physical point of view, but inadequate driver behavior can upset safe and efficient operation as experience from the different turnpikes has shown. The research which has been possible to date does show some things that we can do about this. A few examples follow:

Psychological Factors Are Only Part of the Combination

First and foremost it is necessary to recognize that psychological factors are usually critical in accident causation as one part of a combination of environmental and highway factors which may suddenly increase the difficulty of the task for the driver. Important as psychological factors are, *we cannot look at them as giving us the one cause for an accident.*

Importance of the Everyday Driver

Next you will probably ask about the much mentioned "accident-prone" driver. The idea is alluring that a few consistently poor drivers have most of the accidents and should be dealt with in some remedial fashion. Without going into the many details of research on this subject, let me summarize the results by saying that such consistently "accident-prone" drivers probably represent only a very small part of the traffic accident problem (about 1.0 per cent of drivers and 4 per cent of accidents).[1] Evidence

Presented at Institute for County Highway Engineers, University of Minnesota Center for Continuation Study, December 9, 1957, Minneapolis, Minn.

from both statistical, accident analysis and interview studies indicate that the majority of highway traffic accidents occur to ordinary, everyday drivers and that most drivers learn to drive safely most of the time. They may, however, make misjudgments or fail to anticipate and cope with combinations of conditions which become critical at times.[2]

Driver Behavior in Winter Accidents

A study of weather and road conditions in winter accidents[3] in a set of turnpike accident records showed that (a) private car drivers have more difficulty than professional drivers in spite of the greater difficulty of managing heavier vehicles under icy and snowy conditions and (b) an unduly large proportion of the accidents occurred *immediately after the weather had cleared*. Drivers were apparently trapped into misjudging the condition of the road surface after the snow storm had passed because the weather looked good. This pointed to the importance of immediate clearing and cindering. The turnpike now stations cindering equipment at critical locations when anticipating the occurrence of snow or ice on the basis of weather reports.

Driver Judgment—and—Response Time on High Speed Highways

Data from published research in various fields on human response time was gathered and analyzed in a recent study.[4] The analysis showed that the time required to make judgments or decisions and to respond adequately with the controls of a vehicle increases as the complexity of the task increases. This time may increase from the three-quarters of a second (ordinarily quoted as reaction time for an emergency stop) to three, four, or five seconds and even longer. At a designed speed of 60 miles an hour, five seconds is about 450 feet, which such a complex judgment would require before the driver can respond.

In the case of freeways, the design of the highway is intended to simplify the ordinary driving task as much as possible by limiting incoming vehicles from each side. What then can increase the complexity of the driver's task to such an extent?

Actually, there are a whole host of situations. Signing which is complex may do it, dim taillights on a vehicle ahead may increase the complexity and difficulty of judging speed, unexpected combinations of conditions may do it. Such an unexpected combination may occur when other drivers change their mind at exits and execute a sudden weaving maneuver. And one of the examples of most interest to engineers perhaps is the use of complex interchanges where a strange driver has to not only read a sign, but solve a difficult Chinese puzzle to get where he wants to go.

Man-machine research, sometimes called "engineering psychology" and sometimes called "human engineering and systems research," can assist the design engineer and the traffic engineer in reducing such difficulties.

Speed Itself Does Not Cause Accidents.

A study of turnpike accidents reported some time ago showed that accidents occurred at all of the speeds found on the highway.[2] This will probably be confirmed when adequate large-scale research makes possible other studies with corrections for vehicle miles at each of the speeds on the highway based on adequate exposure data. This finding "makes sense" in terms of psychological factors because under heavier traffic volumes more complex situations may require more difficult judgments of the driver at relatively low speeds. The factor of most importance in terms of driver behavior is the *time required for judgment and an adequate driving response compared to the time available.* Some of the accidents on turnpikes show that there is much which drivers must learn about driving on freeways in order to make the proper judgments, decisions and responses in the time available.

Finally, several research reports from the field crash studies have shown that it is not how fast you drive, but how fast you stop which is critical. Forces may be lethal in a crash stop from only 25 or 30 mph. This is a major principle which all drivers must learn for all driving. Actually a driver's being "in a hurry" is probably more important than speed, because it upsets judgments (see 6).

Drowsiness—A Major Factor

Increasing drowsiness has effects on driving behavior which interferes gradually with efficient control of the vehicle and reaction to hazards on the street or highway. In an experimental study[5] using a dual control car, drivers went to sleep at the wheel within less than three hours even when required to make periodic reports. Objective measurements and checks of their behavior showed an increasing loss of efficiency during a one-hundred twenty mile drive both for subjects who started fresh and much more dramatically for subjects who were sleep deprived. One group of five subjects had had no sleep the night before. Another group of five subjects had had only four hours of sleep over three nights so that their sleep deprivation was cumulative and more like what people may experience before going on a vacation. A larger scale study is planned to obtain a more adequate analysis of factors of importance.

An analysis of near accident reports[6] showed that some drivers felt they could fight sleep until convinced by a frightening experience. Some drivers recounted experiences in which they dozed at the wheel suddenly without control and awoke to find that they had passed a vehicle, jumped a ditch, or in some other way avoided a serious accident by sheer chance and good luck.

A study of turnpike accident records[2] showed 13 to 15 per cent of the accidents involving sleep and later studies corroborated this. Also, fatal accidents probably involve a higher percentage of sleep occurrence.[7]

Here again knowledge of the hazards on the part of the drivers is of first importance.

Driver Knowledge of Hazards and of Proper Operation

From the above examples we see that understanding of hazards and of proper operation by drivers is of primary importance for safe and efficient operation of any highway and much more so for the free flowing expressways and freeways. Many drivers apparently do not know as much as we think they know about the wide variety of factors and combinations of conditions which can occur and become critical for safety, nor even about the ordinary methods of vehicle operation for which highways are designed.

Examples of this occur every once in a while. One turnpike reported some time ago that a woman driver stopped *in the only traveled lane* beside a lane torn up for repair to ask a question of the flagman who was trying to wave her over on to the shoulder. As a result a semi-trailer traveling at the speed limit was unable to stop, tried to go around, jackknifed and killed all concerned.

On another toll road a driver with his family in the car discovered that he was passing the interchange where he had intended to turn off. He stopped and was backing on the fast lane when a bus passing a loaded semi-trailer came around a curve at the speed limit. The bus was unable to miss the car, killing the whole family and injuring some of those in the other vehicles. The passenger car driver lived not far from the turnpike. He apparently did something which he might get by with (though not recommended) on a back road near his town. He obviously did not realize that this maneuver had a high probability of being fatal on a high speed freeway.

We must have large scale research to learn more about what the psychological factors are, why people do apparently unexplainable things which submit them to hazards. Thus we must learn more about what factors lead to dozing while driving, how drivers can recognize and cope with this on the highway, and what hazards drivers do not appreciate, what driving procedures they do not understand, and why they do not successfully allow for combinations of physical factors and behavior of other drivers which may suddenly present them with a very hazardous situation.

In this way we may achieve an appreciation of hazards on the highway on the part of the general public similar to that which has been achieved concerning health of hazards from unsanitary conditions. Until information was made available from the great range of research on causes of diseases and on prevention procedures, the public did not worry much about health hazards. As a result of such research and wide spread dissemination of the facts obtained, however, the public in the more advanced countries now understands and backs public health measures.

Such an understanding of both the hazards and the principles of automobile driving is necessary to achieve the safe and efficient operation of the new freeways being planned and of those already in operation. The research which furnishes the needed additional information must include engineering, psychological, biological, medical, mathematical and other approaches.

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JUDGMENT OF SPEED ON THE HIGHWAY AND ON THE AUTO TRAINER

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Synopsis

In order to test the calibration of the Auto Trainer speedometer, a study was set up to determine the accuracy of speed estimation using five different methods. Two of these were laboratory and three were road studies. This paper is a presentation of results from 18 male subjects on the various sets of experiments made in the study. The results are quite interesting and should be of value to traffic authorities in various ways.

By way of summary, it is shown that drivers estimate speed best in the middle range, 30 to 50 m.p.h. There is a tendency to underestimate low speeds and to overestimate high speeds. It is more clearly stated by saying drivers travel faster than they think at lower speeds and slower than they think at higher speeds. Thus excessive road speeds cannot be attributed entirely to an illusory effect.

In general the laboratory measures show the same directional tendencies as the road tests. This tends to confirm the use of laboratory tests of this nature as valid clinical and educational devices.

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Introduction

Judgment of speed has long been a matter of interest to students of highway safety. Forbes early devised an apparatus which was used in the laboratory for measuring judgment of speed in the longitudinal direction. His apparatus consisted of a long roadway on which metal tape carried small cars. A control car was allowed to travel in traffic on the right side of the road. At such times as there was danger of a collision the operator was required to turn sharply in order to avoid colliding with another vehicle. The number of times that he failed to dodge in time to avoid a collision was recorded electrically. In other words it was comparable to having subjects riding in one car judge at what point they would meet an oncoming vehicle.

Reliability of the measurements was established and an attempt was made to ascertain the validity of the apparatus by means of a road test. In the latter several persons were asked to judge the speed of passing cars. These were correlated with the apparatus and some reasonably good differentiations were obtained. Forbes also experimented with a form of the Munsterberg apparatus in which the estimation of speed was judged along a line at right angles to that of the line of sight. A magnetic device was used so that the errors could be measured by release of a small piece of metal at the point where the subject judged the vehicle crossing the line of travel would be at a given time.

De Silva used a speed estimation apparatus which was improved in some respects. The Chicago Motor Club later devised an apparatus which was very well constructed mechanically. It incorporated the same principles as used by Munsterberg, Forbes, and De Silva into a so-called speed judgment apparatus.

It has three gears which are set at speeds of 37, 60 and 81 m.p.h. The gears can be changed manually by a simple gear-shifting device. A miniature car is made to traverse a window-like opening built into the front of the apparatus. Movement is in a horizontal plane, and from left to right with respect to the subject's line of vision. After the car has passed out of sight and has traveled a predetermined distance behind a screen, the electrical circuit to an illuminated light panel is broken. The subject responds by stating the point he judged the car to be at when the light went out.

This apparatus has been used in the Driving Research Laboratory for several years, mostly for demonstration purposes. Oliver did a special research on this problem. His project was to standardize procedures and to study the relationship between vision, distance judgment and speed estimation. His first problem was to develop a logical procedure and to check the reliability of the apparatus. This was done in a study made at Iowa State College.

During this time the Driving Research Laboratory had acquired a Model B Auto Trainer, built by the American Automobile Association for experimental purposes. Two of these devices are now used for experimental purposes in training drivers. In the course of several unpublished studies it appeared that the speedometer readings might not be representative of the corresponding road speeds, although designed on a reduced scale which is proportional to highway speeds. Therefore, during the summer of 1956 an experiment was set up to determine the validity of the calibrated speeds and of speed judgment in general. Two criteria were used, namely the subjective judgment of the operator and comparison with similar judgments of road speeds of the highway.

The problem is fundamentally that of testing the null hypothesis that there is no difference in the estimation of speed at various rates of travel.

At least indirectly this set of experiments is also a test of the validity of laboratory measures of speed estimation. The hypothesis is that an indication of skill in speed estimation can be obtained by laboratory techniques.

Method of Procedure

A group of 18 male subjects, ranging in age from 25 to 60 years, were taken through a series of five different types of speed estimation experiments. These have been identified as Series I, II, III, IV and V.

In Series I the driver estimated the speed at which he was driving the Auto Trainer. The speedometer was shielded so that it could not be viewed from the driver's seat. A series of 14 trials was made. Speeds varied from 10 to 70 m.p.h. The speed requested for a particular trial was determined by random selection. The experimenter would call out a particular speed, for example 20 m.p.h. When the subject thought he was driving at a speed equivalent to 20 m.p.h. on the road he responded by saying "now." Both the requested and the actual speeds were recorded. Two estimates were made by each subject for each speed set up for experimental investigation.

Series II was similar to Series I except that the speed estimation was made behind the wheel of an automobile in an actual traffic situation. The experimenter took each subject out on the road and at 14 predetermined points suggested that the driver get up to a designated speed at the earliest possible moment. When he thought he had reached this speed he said "now." The actual tachograph reading at the moment the subject said "now" and the estimated speeds were recorded. The order of speed selected was picked at random and two estimates were made for each. Comparisons of the estimated and requested speeds were made.

Series III involved the estimation of speed by laboratory apparatus, namely the Chicago Motor Club apparatus as described. In this device a light was turned on and a miniature car passed an opening where it could be viewed by the subject. After the car was out of view the subject estimated the distance the car had traveled by the time the light went out. Oliver's procedure was followed. Briefly described, the subject was seated at a distance of 10 feet from the apparatus and was allowed to practice for a few trials. Thirty trials were then given—10 at each of three speeds, calibrated by Oliver to be 37, 60 and 81 m.p.h.

Series IV had to do with the estimation of the speed of an automobile traveling on the highway from the side of the road. This was done by driving one of the laboratory experimental cars, a 1956 Plymouth Station Wagon, past a given point at a predetermined speed. All the subjects estimated the speed at which they thought the car passed. They were stationed at approximately the same position but not close enough together so any interchange of ideas could be made.

The actual speeds ranged from 10 to 70 m.p.h. The deciles within which the speeds were chosen were randomly selected. However, the exact speed within the decile was arbitrarily selected. This was deemed necessary in order to avoid a systematic interval between speeds and yet keep the speeds from being too close together. For example, by randomizing the exact speeds it would have been possible to have a speed of 19 m.p.h. in one decile and a speed of 20 m.p.h. in the next decile—a situation to be avoided. Each of the speeds selected was presented twice but never successively.

Series V was somewhat similar to Series IV in that the subjects were estimating the speed of passing traffic. For this part of the study a professional speed detection apparatus was used and stationed at the same point as used by the class for the estimation of the speed of the Plymouth as described in Series IV. As the flow of traffic was quite heavy and it was desired to include only passenger cars and light trucks in the study, the supervisor of the experiment selected only certain vehicles for making the estimation. A red flag was waved to indicate which cars were to be judged. Twenty vehicles were selected. The radar reading was used as the criterion against which to evaluate the subjects' estimates.

Analysis and Results

Tables were made showing the actual and estimated speeds as recorded for each of the five series of judgments. The average estimate was calculated for each speed selected and from this the average error was determined.

The results for series I are shown in Table 1.

Table 1
ESTIMATED SPEEDS IN MILES PER HOUR
SERIES I—AUTO TRAINER

Subject	40	50	20	50	10	70	10	30	40	60	70	60	30	20
1	32	38	30	40	30	42	30	35	38	41	43	40	35	32
2	38	42	30	40	25	45	20	34	37	38	45	40	35	38
3	30	35	15	37	10	40	20	32	38	41	45	40	28	24
4	26	30	18	30	12	40	15	20	28	33	40	38	28	20
5	30	40	25	40	30	42	30	38	38	42	45	42	38	35
6	31	35	20	35	21	40	18	26	32	38	41	39	34	26
7	31	37	22	35	12	42	15	32	35	38	41	38	31	25
8	30	37	32	38	15	40	21	31	38	40	45	40	30	26
9	40	42	30	42	20	45	22	35	38	45	47	44	35	30
10	35	41	27	44	18	47	18	38	40	45	48	44	36	25
11	25	30	20	30	17	38	15	21	25	32	37	32	25	22
12	40	45	32	45	25	47	22	35	40	45	47	45	35	33
13	35	40	30	40	20	45	20	31	38	42	45	40	31	25
14	38	40	35	40	25	44	25	35	40	42	45	44	35	32
15	40	41	35	41	25	45	27	38	42	43	46	40	35	34
16	30	35	21	35	11	40	10	22	28	38	40	38	22	18
17	28	38	25	38	20	40	15	25	32	38	40	40	28	25
18	30	38	23	35	15	38	25	35	38	40	42	38	34	30
19	26	30	15	30	10	38	12	26	28	32	38	30	22	20
Mean	32.4	37.6	25.5	37.6	19.0	42.0	20.0	31.0	35.4	39.6	43.2	39.6	31.4	27.5
Error	-7.6	-12.4	5.5	-12.4	9.0	-28.0	10.0	1.0	-4.6	-20.4	-26.8	-20.4	1.4	7.5

Correlations made on the first and second estimate for the separate subjects averaged around .92. A correlation of .13 was obtained between the designated speeds and the error of estimate.

The tabulations of estimates, average estimates, and average errors for Series II are presented in Table 2.

Table 2
ESTIMATED SPEEDS IN MILES PER HOUR
SERIES II—SUBJECT DRIVING EXPERIMENTAL CAR

Subject	40	50	20	50	10	70	10	30	40	60	70	60	30	20
1	32	49	31	50	10	60	15	35	44	55	60	60	35	27
2	45	54	35	48	10	65	21	35	42	54	62	55	37	27
3	36	49	34	48	6	58	10	36	48	58	66	60	35	24
4	37	43	20	47	3	55	3	24	41	50	62	55	25	16
5	32	45	25	42	2	58	3	29	40	50	63	57	42	36
6	35	45	30	48	10	65	20	38	45	55	58	55	38	30
7	41	50	25	55	20	70	15	39	47	55	69	58	41	28
8	45	50	20	50	2	67	2	40	52	55	68	58	40	25
9	40	47	18	42	2	58	2	30	38	50	58	50	25	20
10	43	54	35	52	5	68	25	34	45	60	68	62	36	30
11	36	51	32	51	5	65	8	32	45	62	64	60	46	35
12	32	45	25	51	5	64	5	30	38	55	63	54	36	28
13	43	51	21	50	2	66	2	35	38	59	64	61	42	25
14	35	45	21	45	3	60	10	28	42	54	60	58	30	18
15	37	50	24	53	3	64	5	40	47	58	68	60	36	28
16	42	51	30	51	10	65	10	32	40	55	60	58	36	31
17	37	47	22	47	2	61	2	34	42	58	65	54	30	19
18	52	58	34	58	10	70	20	35	48	61	65	58	35	34
19	38	50	26	50	5	58	18	35	44	57	65	60	39	32
Mean	38.8	49.2	26.7	49.4	6.1	61.0	10.3	33.7	43.5	55.8	63.6	57.5	36.0	27.0
Error	-1.2	-.8	6.7	-.6	-3.9	-9.0	.3	3.7	3.5	-4.2	-6.4	-2.5	6.0	7.0

Tables 3, 4 and 5 contain the scores made by the subjects on the Chicago Motor Club apparatus, Series III.

Table 3
ESTIMATED DISTANCES IN TWO-INCH UNITS
SERIES III—CHICAGO MOTOR CLUB APPARATUS
Low Speed
Actual Distances in Two-inch Units

	15		4		1		10		13	
Subject	1st Est.	2nd Est.	1st Est.	2nd Est.	1st Est.	2nd Est.	1st Est.	2nd Est.	1st Est.	2nd Est.
1	15	10	5	4	2	1	8	8	12	9
2	15	14	7	6	3	2	9	11	12	12
3	8	8	3	4	1	1	6	7	8	8
4	14	12	6	4	3	2	13	9	12	12
5	10	10	3	4	2	1	8	8	10	10
6	12	11	5	4	3	2	9	9	10	10
7	11	9	5	3	3	2	8	8	10	9
8	9	10	7	4	3	2	9	9	11	11
9	11	11	4	5	1	2	8	10	10	9
10	10	13	5	3	2	2	7	8	8	11
11	14	11	4	3	1	1	9	8	11	10
12	10	8	4	3	1	1	8	6	10	8
13	11	14	2	3	1	2	6	7	5	10
14	10	10	8	5	5	4	10	10	10	11
15	11	10	5	2	2	1	8	7	7	8
16	12	10	5	4	2	1	9	7	11	9
17	13	12	4	5	2	3	6	9	9	11
18	11	9	6	5	3	2	8	9	10	11
19	12	6	6	3	2	1	7	7	10	7
Mean	11.4	10.4	4.8	3.9	2.2	1.7	8.2	8.3	9.8	9.8
Error	-3.6	-4.6	.8	-.1	1.2	.7	-1.8	-1.7	-3.2	-3.2

Table 4
ESTIMATED DISTANCES IN TWO-INCH UNITS
SERIES III—CHICAGO MOTOR CLUB APPARATUS
Medium Speed
Actual Distances in Two-inch Units

	3		5		2		8		12	
Subject	1st Est.	2nd Est.	1st Est.	2nd Est.	1st Est.	2nd Est.	1st Est.	2nd Est.	1st Est.	2nd Est.
1	6	5	7	5	3	3	9	8	10	10
2	6	5	8	6	5	4	9	8	14	12
3	4	4	5	4	3	3	6	7	8	8
4	4	6	6	5	5	4	10	8	12	12
5	4	4	6	5	3	3	8	7	8	10
6	5	5	7	6	3	3	8	7	9	9
7	5	5	5	5	4	3	8	5	9	8
8	8	6	7	7	4	4	9	9	11	9
9	4	5	5	3	3	2	8	5	10	9
10	5	5	4	5	3	3	8	7	9	10
11	4	3	5	5	2	3	7	7	12	9
12	4	3	4	4	3	2	6	5	9	7
13	2	2	4	4	1	1	7	6	11	9
14	7	8	9	6	5	5	10	9	11	10
15	4	3	5	4	3	2	6	10	10	7
16	5	3	5	4	3	2	7	6	9	8
17	5	2	6	4	4	3	8	5	11	7
18	9	5	8	7	5	4	8	6	12	8
19	13	4	8	4	6	3	7	6	8	6
Mean	5.5	4.1	6.0	4.9	3.6	3.0	7.8	6.8	10.2	8.8
Error	2.5	1.1	1.0	-.1	1.6	1.0	-.2	-1.1	-1.8	-3.2

Table 5
ESTIMATED DISTANCES IN TWO-INCH UNITS
SERIES III—CHICAGO MOTOR CLUB APPARATUS
High Speed
Actual Distances in Two-inch Units

	7		6		9		16		11	
Subject	1st Est.	2nd Est.	1st Est.	2nd Est.	1st Est.	2nd Est.	1st Est.	2nd Est.	1st Est.	2nd Est.
1	9	6	8	7	10	8	12	12	10	12
2	10	9	9	8	12	9	15	15	12	13
3	8	7	7	6	9	9	11	11	9	10
4	9	6	7	8	8	12	14	12	10	9
5	8	7	9	6	10	12	15	13	12	9
6	12	9	7	8	8	12	13	14	14	10
7	8	7	6	6	8	9	9	11	10	10
8	11	9	8	8	10	12	13	13	11	12
9	7	8	5	6	8	8	11	12	9	10
10	8	8	6	6	10	10	13	13	11	8
11	7	8	6	6	7	8	14	14	11	11
12	8	6	4	4	6	7	10	11	7	8
13	5	7	5	5	8	7	12	14	10	11
14	9	5	9	7	10	9	12	10	10	7
15	8	7	6	7	8	9	11	10	10	9
16	6	5	6	7	8	7	11	9	9	10
17	9	7	8	8	8	9	13	11	10	8
18	10	8	9	6	8	8	12	12	10	10
19	8	6	7	5	10	8	11	10	10	8
Mean	8.4	7.1	6.8	6.5	8.7	9.1	12.2	11.9	10.3	9.7
Error	1.4	.1	.8	.5	-.3	.1	-3.8	-4.1	-.7	-1.3

The speed judgment by means of the Chicago Motor Club apparatus is not immediately comparable to the other types of estimation since the speed was estimated in distance units traveled rather than miles per hour. The general nature of the curve was somewhat similar to the ones based on miles-per-hour estimates. The magnitude of the errors was greater for the slower speeds.

The correlation between positive and negative errors on this device varied considerably with the speed. The average correlation was —.67. This seems to indicate that there was a tendency for the subject to either make a decidedly over-estimation or a decidedly under-estimation of the distance traveled by the miniature car before the light went out. There was great variation among individuals.

The estimates of the speed of the Plymouth as it was driven past the group together with the actual speeds as recorded by the experimenter, Series IV, have been compiled in Table 6.

Table 6
ESTIMATED SPEEDS IN MILES PER HOUR
SERIES IV—SUBJECT STANDING BESIDE ROADWAY—PLYMOUTH

	Actual Speed in Miles Per Hour													
Subject	42	58	24	58	10	70	10	35	42	64	70	64	35	24
1	—	—	—	45	15	65	10	35	35	60	70	50	40	25
2	—	—	—	38	7	45	4	18	22	37	30	50	33	27
3*	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4	—	—	—	55	15	60	10	40	40	55	65	50	35	25
5	31	49	25	55	12	58	8	28	40	55	60	53	20	22
6	42	50	22	60	12	68	9	32	26	65	70	56	31	14
7	—	40	25	55	12.5	65	10	38	50	58	67	52	37	22
8	40	48	26	64	15	64	12	32	45	58	70	53	36	18
9	42	55	30	50	15	60	10	40	55	65	60	57	38	22
10	45	55	20	58	15	60	10	40	50	57	55	58	35	30
11	29	55	10	55	4	71	5	35	43	50	65	47	40	20
12	35	45	25	40	8	62	5	32	42	56	64	52	32	26
13	30	42	21	50	15	48	10	36	45	60	56	50	36	28
14	35	47	22	49	15	58	11	38	36	50	55	58	30	20
15	45	50	32	40	19	65	12	40	45	60	65	52	38	24
16	—	—	—	50	12	55	15	35	45	65	60	55	30	25
17	48	55	23	58	8	63	7	35	42	58	58	53	38	28
18	25	35	15	30	8	50	10	30	35	55	60	45	25	18
19	40	45	20	50	12	63	10	30	30	65	68	55	35	22
Mean	37.5	47.9	22.6	50.1	12.2	60.0	9.3	34.1	40.3	37.2	61.0	52.6	33.8	23.1
Error	-4.5	-10.1	-1.4	-7.9	2.2	-10.0	-.7	-.9	-1.7	-6.8	-9.0	-11.4	-1.2	-.9

Dash dash or blank indicates the subject was absent or did not record estimate.

Series V, comparison of estimates of speed of passing car. The results of the 18 sets of estimates on each of the 20 vehicles together with the radar readings are shown in Table 7.

As a means of comparing the magnitude and direction to the errors on the various types of speed estimation studied, graphs were constructed as shown in Figure I. It was necessary to graph the errors made in Series III separately since they represented distance units rather than miles per hour.

Figure I shows both the magnitude and direction of error for speeds ranging from 10 to 70 m.p.h. An inspection of the graphs in Figure I will reveal that the drivers used in this study tended to underestimate speeds below 30 m.p.h.* That is, actual speed was greater than the subject's estimate of it. In the 30 to 50 m.p.h. speed range the estimated speed was very close to the actual speed. Beyond 50 m.p.h. there was a tendency to overestimate. That is, the actual speed was less than the estimated speed.

*Due to confusion in logic there is danger of misunderstanding the data. Whenever the estimate line is above zero the subject drove faster than instructed and the reverse. Figure 1, top graph.

Figure—1

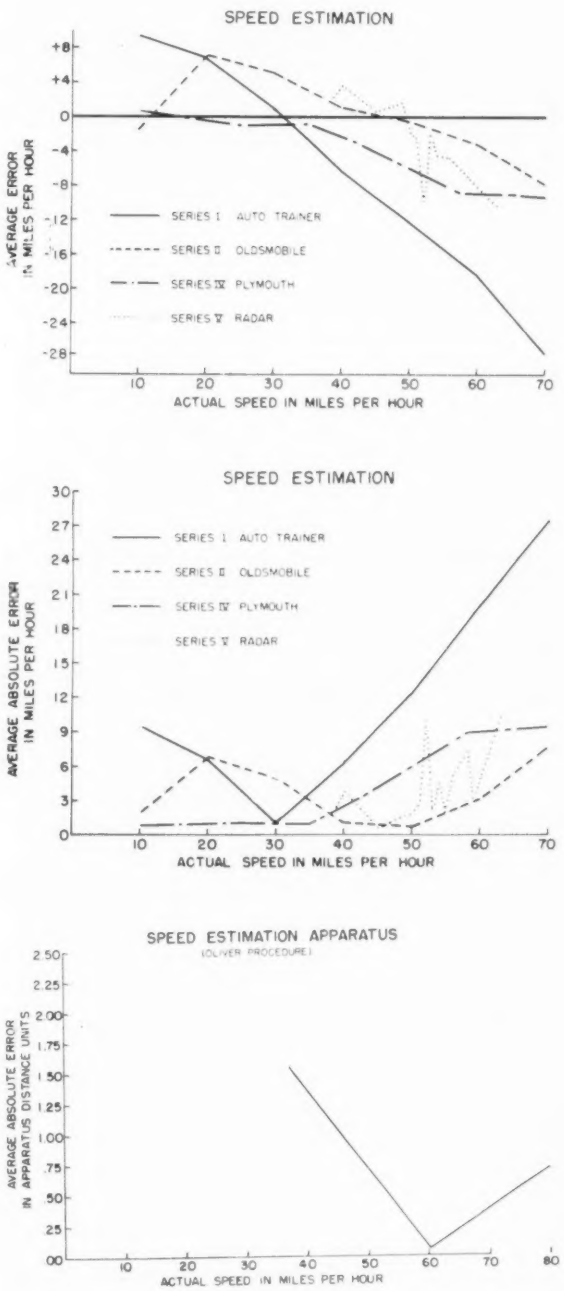

Table 7

ESTIMATED SPEEDS IN MILES PER HOUR
SERIES V—SUBJECT STANDING BESIDE ROADWAY—RADAR DETECTOR

	Radar Speedmeter Readings																		
Subject	63	51	54	50	49	56	45	40	63	50	50	52	40	52	55	53	50	53	39	58
1	60	50	50	50	65	65	50	50	70	50	55	50	50	45	50	50	50	55	40	55
2	52	61	60	58	68	55	50	48	53	58	49	45	45	50	55	56	55	65	46	67
3																				
4	60	50	50	50		55	50	50	65	50	45	40	50	50		55	60	60	55	
5	45	45	42	40	51	55	50	40	60	50	52	45	48	40	55	53	58	55	40	52
6	45	42	46	44	40	46	38	36	42	40	43	45	39	38	42	43	40	39	35	40
7	45	45	50	52	48	50	47	45	50	50	47	40	45	45	50	50	52	50	50	45
8	48	50	53	48	50	48	45	43	50	46	45	36	38	35	45	46	48	52	46	52
9	54	48	49	48	55	55	48	45	58	43	45	47	40	38	55	48	51	55	40	56
10	60	48	56	45	45	45	40	35	45	40	40	38	45	40	50	45	48	53	38	40
11	55	50	50	45	45	45	40	40	55	45	45	50	45	42	55	49	48	45	38	45
12	62	58	55	58	50	65	50	48	58	60	57	45	53	45	65	55	60	55	45	62
13	50	40	38	40	45	40	36	40	55	45	45	50	38	40	55	45	50	45	30	36
14	49	40	43	45	48	44	40	45	55	50	45	40	45	40	55	44	40	50	40	45
15	42	45	45	41	40	48	47	42	46	45	47	41	43	40	45	46	48	50	35	42
16	50	45	55	45	50	50	50	45	50	45	45	45	45	45	60	50	45	50	45	55
17	58	52	48	45	42	45	45	43	55	50	50	45	48	40	55	48	53	58	38	52
18	45	50	45	50	60	50	45	40	50	45	50	35	40	35	60	50	55	60	40	60
19	50	50	55	50	60	52	50	45	52	47	42	35	36	35	50	45	50	52	43	58
Mean	51.7	48.3	49.4	47.4	50.7	50.7	45.6	43.3	53.8	47.7	47.1	42.9	44.1	41.3	53.1	48.8	50.6	52.7	41.3	50.7
Error	-11.3	-2.7	-4.6	-2.6	1.7	-5.3	.6	3.3	-9.2	-2.3	-2.9	-9.1	4.1	-10.7	-1.9	-4.2	.6	-.3	2.3	-7.3

The graphs revealed a general tendency to underestimate at low speeds and to overestimate at high speeds. The closest estimates were in the speed range from 30 to 50 m.p.h. The largest errors were in the judgment made at high speeds.

Summary and Conclusions

In order to determine the accuracy of speed estimation on the highway and to check the validity of laboratory speed estimation apparatus, as well as to determine whether or not the calibration of the Auto Trainer is satisfactory, a series of five experiments was set up in which 18 common subjects were used to determine the magnitude of error which might be expected in estimating speed.

Besides three sets of highway experiments used to determine the degree to which speed may be estimated correctly, two laboratory devices were used. The highway experiment consisted of having the subject estimate the speed he was driving and also to estimate the speed of passing vehicles while the subject was standing by the roadside.

The data thus gathered from highway observations were tabulated and the average estimates as well as the average errors were calculated. The average arithmetic error and the average algebraic error for each speed studied were examined in graphic form so that the magnitude and direction of the errors were revealed. A comparison of the errors on the various types of speed estimation was also made.

Within the limitations of the sample used, number of subjects, and nature of the results obtained, the following conclusions may be tentatively drawn:

1. In the light of the above hypotheses the graphs seem to indicate that there is a difference in the estimation of speed at various rates of travel and that the null hypothesis, that there is no difference in the estimation of speed at various rates of travel, can be rejected.

2. The estimation of speed on the Auto Trainer follows the same systematic error as for the other series studied. The second hypothesis, that an indication of skill in speed estimation can be obtained by laboratory techniques, can be partially accepted in that the general nature of the graphs for estimation of speed as simulated by the Auto Trainer are similar to those for the other types of speed estimation made in the study. However, the magnitude of the errors was greater as indicated in Figure 1. This was true for both the very slow and the very fast speeds.

3. There is a general tendency to underestimate low speeds and to overestimate high speeds.*

4. The closest estimates of speed are made in the 30 to 50 mile-per-hour range.

5. The nature of the errors in estimating the speed as indicated on the Auto Trainer are similar to those made in other types of speed estimation. The magnitude of the errors are decidedly greater.

*The driver goes faster than he thinks at lower speeds and slower than he thinks at higher speeds. There may be a bias here due to the fact that the driver was being observed. If such is true one would expect a similar effect at low speeds which was not found.

Listing of

RESEARCH PROJECTS

BELOW is a list of research projects of which the National Safety Council has knowledge. Some of these projects are still in the process of completion, some have been already completed, and some have been recently published.

Each project has been classified by a library classification number, used by the Bureau of Highway Traffic at the Yale University. Each member is a subdivision of a principal heading. The headings are as follows:

000 General
100 Road Users
200 Vehicles
300 Fixed Facilities
400 Traffic Characteristics and Controls
500 Law
600 Education
700 Administration
800 Economic and Sociological Aspects
900 Planning

The title is in quotes, and the name and address of the institution where the research is being done follows, with the name of the principal investigator. Short summaries are available on what the investigators are trying to do, but anyone wanting more than a summary of 100 or 200 words will have to correspond directly with the institute or individual doing the research.

All of this material will be abstracted and presented in the future in more detail than the list below provides. These abstracts will be published in subsequent editions of the RESEARCH REVIEW in the space now used for this listing. Any new reports of research will be immediately abstracted and presented in this journal in the earliest possible edition. In the March edition of each year a revised listing similar to the one below will be printed and will contain all additional research titles, etc., that have been received during the past year.

#130—"The Psychological Aspects of Farm Work Efficiency"—Bostrom Research Laboratories, Bostrom Mfg. Co., Milwaukee, Wis., Dr. Melvin A. Schmitz, Chief Engineering Psychologist.

#212.3—"Locked Wheel Skid Performance on Various Tires on Clean, Dry Road Surfaces"—Michigan State U., East Lansing, Michigan, Samuel Mercer, Jr., Associate Professor, Applied Mechanics Dept.

#316.3—"Night Legibility Distances of Highway Signs"—Highway Traffic Safety Center, Michigan State Univ., East Lansing, Mich.; Terrence M. Allen, Highway Research Engineer, Virginia Council of Highway Investigation and Research.

#422—"Theory of Speed Zones in Developed Areas"—University of Illinois, Urbana, John E. Baerwald, Asst. Professor of Traffic Engineering. Feb.57.

#470.1—"Case Studies of Traffic Accidents—An Inquiry into the Possibilities of Intensive Investigation as a Source of Basic Information on Nature and Causes of Traffic Accidents"—The Traffic Institute, Northwestern U., 1804 Hinman Ave., Evanston, Ill., J. Stannard Baker, Director. 58.

#470.3—"Accident Experience of Passenger Cars and Commercial Vehicles on Iowa Highways During the Years 52-56"—Iowa Dept. of Public Safety, Des Moines, Iowa, Dr. Clifford O. Swanson, Chief of Research and Statistics.

#470.3—"Comparison of Motor Vehicle Traffic Death Rate Trends in Iowa, Washington, and the U. S."—Driving Research Laboratory, Iowa State College, Ames, Iowa, Dr. Clifford O. Swanson, Research Assistant; Dr. A. R. Lauer, Director, Dec. 56.

#470.32—"Causes of Highway Accidents: U. S. Experience"—Stuart Rice Associates, Inc., 1129 Vermont Ave., Washington, D. C., Libert Ehrman, Vice President. Aug.57.

#471—"Automobile Accidents—Cooperation in Research for Control"—Baltimore City Health Dept., Dr. Matthew Tayback, Asst. Commissioner of Health for Research; Maryland Traffic Safety Commission, Paul Burke, Director.

#475—"Relationship of Roadway Elements to Traffic Accidents"—Traffic Engineering Div., Oregon State Highway Dept., F. B. Crandall, Traffic Engineer. Jan.56.

#475—"Effect of the Prevailing Speed Law Type on the Traffic Fatality Rate in the U. S."—Driving Research Laboratory, Iowa State College, Ames, Iowa, Dr. Clifford O. Swanson, Research Assistant; Dr. A. R. Lauer, Director. Dec.57.

#603—"Michigan Plan Can Be Evaluated"—Driving Research Laboratory, Iowa State College, Ames, Iowa, Dr. Clifford O. Swanson, Research Assistant; Dr. A. R. Lauer, Director.

#611.2—Iowa Driver Improvement Schools Course of Study"—Iowa State Teachers College, Bert L. Woodcock, Dir. of Safety Education; Iowa Dept. of Public Safety, Russell I. Brown, Commissioner, Des Moines.

In Process:

#611.2—"The Improvement of Written Driver License Examinations Through Test Analysis"—and

#701—"The Design of a Selection Instrument to Predict Success to Various Jobs in the Motor Vehicle Dept."—Institute of Government, U. of North Carolina, Chapel Hill, N. C., B. J. Campbell, Research Associate.

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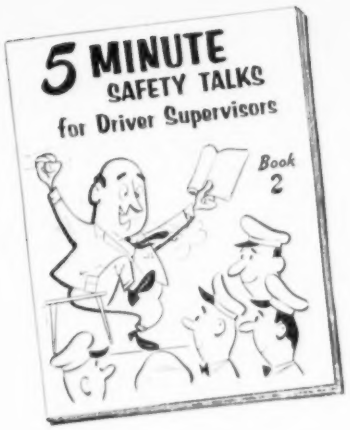

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